

A STUDY OF BUS TRANSIT PLANNING IN SMALL URBAN AREAS

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Final Report

A STUDY OF BUS TRANSIT PLANNING IN SMALL URBAN AREAS

TO: J. F. McLaughlin, Director
Joint Highway Research Project

March 27, 1973

FROM: H. L. Michael, Associate Director
Joint Highway Research Project

The attached Final Report titled "A Study of Bus Transit Planning in Small Urban Areas" has been authored by Messrs. M.S. Herman, G. T. Satterly, Jr., W. L. Grecco, and K. W. Heathington. The research and preparation of the Final Report was sponsored by the Urban Mass Transportation Administration of the Department of Transportation through a program of Research and Training in Urban Transportation funded at Purdue University in the School of Civil Engineering.

The attached copy of the Report has been duplicated by the Joint Highway Research Project and is presented to the members of the Advisory Board as information of interest and value to the transportation functions of that body.

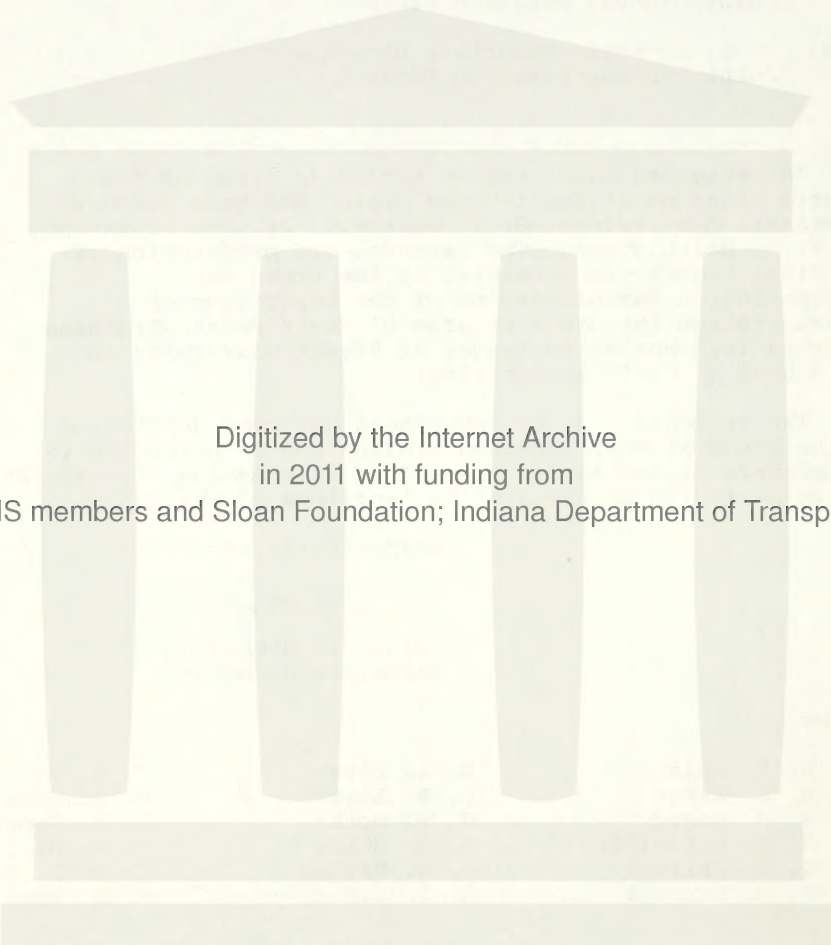
Respectfully submitted,

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Final Report

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Purdue University
West Lafayette, Indiana
March 27, 1973

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SUMMARY

A need for guidelines covering the methodology for bus transit planning in small urban areas is well documented. This need is further evidenced by the large number of small privately owned bus systems that have been forced out of business due to declining revenue.

This study presents a bus transit planning process and provides alternatives to the city for conducting various phases of the planning process. The information for the guidelines was obtained from current literature, bus transit studies, and discussion with persons active in the bus transit field.

The study can be helpful to an understanding of the conduct of transit studies or the evaluation of studies provided by consultants. In general the information in the report should prove useful to anyone interested in studying the transit planning process for small urban areas.

HOW TO USE THIS STUDY

In reviewing this report the reader should recognize that, while the material presented can be useful in planning, conducting or evaluating a bus transit study it should not be construed to be an official guide to follow nor does it propret to be all inclusive in its scope.

The study does provide a broad treatment of many facets of bus transit planning. It also attempts to give an insight into many of the actions that an area planning organization should consider or take.

The reader should refer to the Urban Mass Transportation Administration for current information regarding Federal Support Programs.

INTRODUCTION

In the past only the larger cities in the United States were concerned with bus transit planning. Bus transit was necessary in these large cities because of the large number of people dependent upon it and because of the rapidly increasing congestion on the highways which were unable to carry the large number of vehicles in the peak periods.

Many cities under 200,000 population were completely auto oriented and those which had a bus system were not experiencing congestion problems similar to the large cities. Generally, the bus systems in these smaller cities were privately owned and operated and provided efficient service as long as the system was profitable.

This situation has changed in many cities throughout the United States. More and more small privately owned bus systems have been going out of business due to a sharp decline in revenue. Thus, many cities have been forced to take over these faltering bus systems in order to provide service to those people in the community who depend on the system for transportation.

In order for the city to improve the bus system and operate it more efficiently it is necessary to obtain data upon which to base recommended changes. In many cases the

city manager or engineer is put in charge of the study. This may mean that the city conducts its own study or that the manager or engineer oversees a study conducted by a consulting firm.

In either case it requires the manager or engineer to be knowledgeable about transit planning. In many cases the manager or engineer lacks this knowledge and he has to seek information on transit planning, especially what to do and standards to be met. This requires collecting sources and sorting out pertinent information.

A search through any good transportation library would indicate that much has been written concerning transit planning. However, further investigation would show that much of this information deals with planning in the large metropolitan areas. Also, many of the techniques and procedures were developed for use in large metropolitan areas. This does not mean that they cannot be used in small urban areas but in many cases the techniques and procedures must be applied differently.

The main problem with the present information is that in many instances each publication only covers one or two phases of the planning process. For the person in charge of transit planning in the small urban area, this means reviewing numerous publications in order to cover the complete planning process. Not only is this inconvenient but it is confusing; particularly to someone who is not familiar with the transit planning process.

This report studies the information necessary for transit planning in small urban areas generally under 200,000 in population. The contents cover the complete planning process from public acquisition of the transit operations to implementation of the plan.

There are a number of reasons for looking at small urban areas. This appears to be the place where most of the future bus transit planning will be done; for approximately 80 per cent of the existing intracity bus transit operations are located in cities under 200,000 in population. Most of these companies are privately owned and operated. However, as the profit potential of transit declines these companies are forced out of business and cities are forced into the transit business.

It is at this point that the city decision makers need clear, concise, and complete information on the various alternatives available to solve the city's transit problems. This report attempts to discuss the procedures that can provide much of the information. It should be emphasized that the procedures will not make the decisions for the city, rather they will present the necessary information so that the decision makers can decide what path the city should take in solving its transit problems.

CHAPTER I. MANAGING THE STUDY

The purpose of this section is to describe the framework and organization of personnel to conduct a bus transit study. However, before beginning the city must make several major decisions.

MAJOR DECISION #1: Is the city or a consultant going to conduct the study?

This is an important decision for the city as it will determine the organization of the study and the personnel required. This should not be a hasty decision but should be the result of an extensive analysis of the city's personnel and resources. Some of the more important considerations are listed below.

Things to Consider

1. The reasons for conducting the study.

Is there a desire to make minor changes in the existing system or are major changes desired? What are the general goals and objectives of the city in providing public transportation? Is there a need to involve the public and to create more public awareness concerning bus transit?

These are just a few of the questions the city should consider in trying to determine the reasons for a study and what is expected from the study.

2. Does a planning body exist?

The city should look at the personnel in the planning department and the qualifications of each. What type of work has the department done in the past; was it satisfactory? What is the present work load of the department? Could personnel be made available for work on a bus transit study and for how long?

If a planning body does not exist, is there a desire to establish one? Does the state have a planning agency that can provide some assistance?

3. Legal constraints to setting up a planning body.

If a need exists for the establishment of a planning body what are the legal restrictions? What area is to be served by the planning body; city, county, etc? What political areas and agencies will be concerned with the transit study?

4. What facilities and city personnel are available?

Check with all city departments to find out what facilities are available such as computers, calculators, drafting equipment, etc. Check on the work loads of each department to find out what personnel might be available for assisting in a transit study. These personnel would include people from the engineering and various departments such as the welfare and health departments. People with experience in different areas can provide beneficial advice for the transit study. People with experience in the following areas can be

of great help: engineering, planning, sociology, statistics, economics, law, coding and keypunching, drafting, interviewing, and general office work such as typing, shorthand and filing.

Is there a university nearby whose faculty may be consulted and/or facilities used? Are there commercial or industrial establishments that could provide assistance?

5. Has a transportation study been conducted?

This is an important question, for if a study has been conducted within the last five to ten years, it might provide valuable information for the transit study. This information can save the city time and money if it can provide data on the travel characteristics of non-transit users and also data concerning land uses and traffic generators.

A word of caution is necessary here. The city must make sure that the above information is readily available. In many cases only aggregate data is available as a final report. It will be necessary to obtain individual data such as tally sheets and matrix trip tables. In some cases these are included as an appendix to the final report. In any case the city must check to see what information is available.

If the city planning department conducted the transportation study then the information is probably in the planning files. However, if a consultant conducted the study this information may or may not be in his files.

6. Time available for the study.

In general, a consultant can complete a transit study in less time than it will take the city. This should not be surprising since the consultant has the necessary personnel and is organized for this type of work. However, it is false to assume that it will cost the city less if a consultant does the study.¹ In many cases it will cost the city more, and it may take the consultant as long as for the city to conduct the study.

7. Is financial assistance available?

Before deciding who is to conduct the study it would be wise to see what federal or state assistance is available. No matter if the city or a consultant conducts the study, the city might qualify for a technical studies grant from the Urban Mass Transportation Administration (UMTA). A technical studies grant could cover up to two-thirds of the costs for transit planning. Also, if the final study meets the UMTA requirements the city may qualify for a capital grant for the purchase of new equipment, buildings, etc. Since the requirements under which UMTA operates may change from year to year it is best to contact UMTA at the beginning of the study to make sure that the study will fulfill their requirements.

The considerations listed above are not meant to be all inclusive. Rather they are used to help the city set a pattern for its thinking concerning a transit study and who

might conduct it. In some cases the city may do most of the study and contract certain parts, such as the interviewing and data tabulation. In the end the final decision must rest with the decision makers of the city.

Listed below are some of the main advantages favoring the use of a consultant or city personnel for conducting the transit study.

Advantages of Consultant

1. It will take less time to get the study initiated and completed.
2. Consultants generally have some of the best professional personnel in the field.
3. Consultants generally have access to the most recent data and techniques used in the planning field.

Advantages of City Personnel

1. Generally, the personnel involved are more concerned with the city's transit problems and their solution than is a consultant.
2. The political and social problems that are present in the city and their effects are more evident to the people living within the area.
3. Public awareness and involvement is generally greater than if a consultant conducts the study.

4. After completion of the study the information and techniques used in the study are still available as well as the personnel who conducted the study. This can be helpful in the implementation phase. This is particularly true if changes need to be made in the final plan during implementation.

The above listing is not at all complete but it puts forth the major advantages for having a consultant or the city conduct the transit study. Again it must be emphasized that the final decision rests with the city's decision makers. Their decision must be based on what the city desires and its capability to fulfill those desires.

Consultant to Conduct Study

If the city decides to have a consultant conduct the study, then its next task is to choose a consultant.

MAJOR DECISION #2. Which consultant should be hired?

Choosing a consultant is not an easy task but the following guidelines set forth by the International City Managers' Association should prove helpful.²

Selection of the Consultant

The first step in securing outside aid is to define the general nature, type, and scope of the problem, list the technical resources available locally, and decide what outside technical services are desired. On the basis of these general specifications, inquiry concerning consulting services can be made of a number of consulting firms and agencies. The firms should be invited to state their interest and availability, and to offer suggestions as to possible modifications of the proposed consulting service program.

Where the consultant expresses interest in the undertaking, he should be required to indicate at least generally how the project would be staffed, scheduled, and otherwise conducted, and to provide appropriate references in jurisdictions previously served and examples of reports prepared as well as estimates of the probable cost of professional services to be rendered. After analyzing replies and making inquiry of references it is advisable to hold interviews with representatives of several firms. The prospective consultants might be asked to cite all projects they have performed rather than a few selected undertakings.

Inquiry could then be made of responsible officials who were in office when the consulting work was done and who have lived with the results of the work. Only in this manner, except perhaps in the case of a limited number of nationally known consultants, can the municipality assure itself that it is likely to receive technical services of the type and calibre which it desires. This checking-up process before consulting services are engaged is highly desirable from the point of view both of the municipality and of any reputable consultant.

Since the city is employing personal services it should be as exacting in employing a consultant as it is in putting a top-level professional person on its payroll. Similarly, from the point of view of the consultant, anything which enhances the municipality's confidence in him or his firm will contribute to a type of working relationship essential to effective consulting services. Also, possible differences over what is expected from whom should be resolved before, rather than after consulting services are formally engaged.

In the course of using consulting services, municipal officials will find it profitable to provide full local cooperation and a maximum of competent local technical participation. This can do much to expedite progress and minimize the cost of outside service. In addition, it provides local employees with useful training opportunities and a valuable knowledge of what was done, when it was done, and what the future operational requirements are. Needless to say, this opportunity should not be wasted by assigning to the consultant any other than capable local technicians.

Competitive Bidding

As in the case of the employment of other types of professional consultants, such as accountants, architects, attorneys, and professional engineers, it is not desirable for the city to obtain formal bids and make the award to the lowest bidder. There are real advantages, however, in securing statements from several consultants first as to the extent and kind of work they would perform, and second as to their estimate of the cost of the services.

Follow-Up

The responsibility for following through on work done by a consultant belongs primarily to the local jurisdiction. Most of the follow-through aspects of an undertaking lie beyond the authority of the consultant, and even the best consulting work can be no more effective than the degree of follow-up exercised by local officials.

The credit for a successful consulting project belongs no more to the consultant than to the public officials who engage him. The objective must be defined clearly, and local officials must recognize project limitations and the capacity of the local staff for work with the consultant, provide the consultant with local facilities that will make for the maximum utilization of the consultant's staff and preferably furnish some local participation of technical grade, make expeditious decisions on those matters which affect project progress, observe the project progress, and make known to the consultant any dissatisfactions.

Above all, the authority and responsibility for making decisions rests with local officials and not with the consultant. Accordingly, local officials must make decisions on all recommendations, accepting them, rejecting them, modifying them, or in some instances establishing a specific schedule and procedure for their reconsideration. Also local officials should make known to the consultant any difficulties encountered in the continued operation of systems which the consultant has developed.

Once the consultant is chosen, the city's main task will be to work with the consultant to make sure the work performed

is satisfactory. The guidelines will be helpful in evaluating the consultant's work. The city still must choose a study director to work with the consultant, and set up its advisory committees. These tasks will be discussed in the next section.

City to Conduct Study

No matter who conducts the study, the following important decision must be made.

MAJOR DECISION #3: Who is to be the study director?

The qualifications of a study director can not be standardized. In general, he must be more of a manager than a technician. However, he should possess some knowledge of the general planning process. Above all he must be able to get along with people and communicate ideas to the politician as well as the technician. Of all the people in the study his job will be the most difficult. He must coordinate the work of all the different departments and agencies. He must act as the communications link between the various committees and the planning group to insure that everyone is informed of the problems and progress of the study group.

The full importance of his job will not be realized until the implementation phase of the study. If he has done a good job of coordinating the work of all groups and informing all persons involved, especially the public, then there should be little opposition to the implementation of the

study recommendations. This has been the problem with many of the studies conducted in the past. They have lacked public support, due to a lack of communication during the study, and have therefore not been implemented.

There are a number of ways of obtaining a study director. Many cities hire a study director and others have appointed a member of the technical committee to be the study director.³ Generally, the study director's job will be a full time position. This means that it will be difficult to find someone already on the city's staff who will have the time to perform his present duties as well as those of study director.

Another possibility for a study director might be the eventual manager of the transit operation. In many cases where a city takes over transit operations from a private operator, the city must hire a new management team to operate the system. If this is the case, then it might be possible to hire the transit manager to be the study director until the study is completed and the city takes over the operation of the transit system. Many times, when a city takes over a transit system it will make an agreement with the private operator to continue operating the system until the city has time to complete a study and decide what is to be done.

If the new transit manager acts as the study director it will give him an opportunity to become familiar with the

city's personnel and the public. He also will become familiar with all aspects of the study which should aid him in the implementation of the study recommendations when he assumes his duties as the transit manager.

A word of caution should be inserted here. The city must be careful that the study director does not impose his ideas into the study over the wishes of the advisory committees. Although the study director should be impartial in his work he none-the-less occupies a very influential position.

There is much discussion as to whether a local person will do a better job than someone from outside the area. In some cases a local individual can understand some of the political and social problems of the area better but there is also the chance that he may impose his own prejudices on the study group. The individual from outside the area is generally impartial and could bring fresh ideas into consideration, but this may provide the possibility of some of the existing problems of the area being overlooked. Also, he may not have the self interest in doing as good a job as someone who lives in the area and must live with the results.

Obviously, there is no single way of obtaining a good study director. Again, the final decision must rest with the city's decision makers.

Establishing Committees

At the same time and in some cases before the study director has been chosen, the city must set up its advisory committees. There are three committees which are generally used when conducting any type of planning study. These are a policy committee, a technical committee, and a citizens advisory committee. Each of these will be discussed below.

Policy Committee. This committee is made up of elected and appointed officials from all political areas and other agencies affected by the transit study. The committee's function is to set policy and make the decisions concerning the hiring of consultants, the study director and other personnel. Also, this committee reviews the final work and sees that it is presented to the public. In many cases this committee will be set up at the start of the study to make the necessary decisions for the city.

This committee usually appoints a technical committee to advise them on the technical aspects of the study. A citizens advisory committee is also appointed by the policy committee to advise them on the public views concerning the study. Coordination among the various committees and the study group is handled by the study director. There is no set number of people to be on the policy committee. The main thing is to have all sections of the area represented.

Technical Committee. This committee is made up of technical personnel such as city and county engineers, planners

and possibly representatives from state agencies. Anyone with technical ability that might be of help to the study group would be a good committee member.

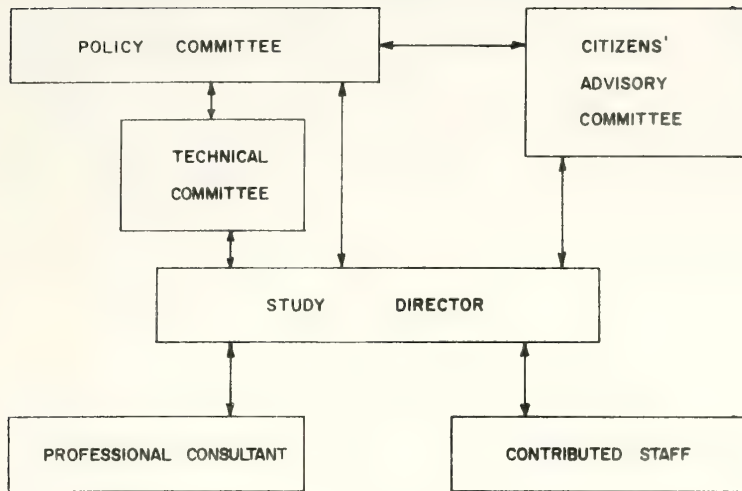
If the city is conducting the study then the technical committee will work closely with the study group making recommendations about the type of techniques and methods that might be used in conducting various parts of the study.

Generally, each agency and political area represented on the policy committee will appoint members to the technical committee. Not only will this insure a good representation on the technical committee but the technical committee member can then keep his agency or area informed on what is happening and explain the technical aspects of the study.

Citizens Advisory Committee. This committee is made up of people from all parts of the community. Their job is to let the policy committee know what the public wants and does not want in its transit system. The main thing here is to get a good representation of the community's various interest groups on the committee.

The main idea in all the committees is to promote communication between the public, the elected officials, and the technical personnel. Figure 1 shows the study organization and the relationship between the various committees. Hopefully, by communicating between these groups throughout the study the final recommendations will meet the approval of all concerned and therefore have a good chance for implementation.

CONSULTANT CONDUCTS STUDY



CITY CONDUCTS STUDY

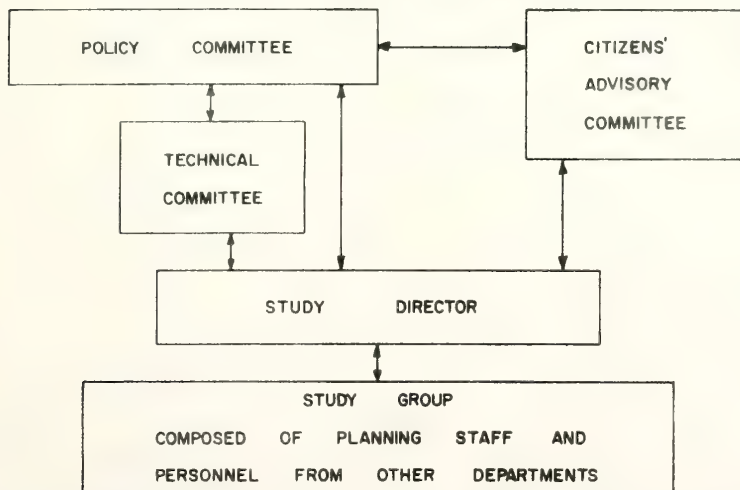


FIGURE 1
STUDY ORGANIZATIONS & RELATIONSHIPS

Study Group Organization

After the committees are established and the study director chosen, then it is time to set up the study group if the city is going to conduct the study itself. This is the group that will actually perform the study. It is at this point that the policy and technical committees must work with the study director to determine what departments will perform various tasks.

If the city has a planning department, the planning department will generally perform the bulk of the study. However, many parts of the study may be handled by other city departments. Additional personnel might be obtained on a temporary basis from other city departments or hired specifically for the study team. Each department should be contacted to find out what information and personnel will be available to the study group. The technical committee should be helpful in pointing out areas where each city department might be of help.

It is important at the outset to establish lines of communication and responsibility between the departments working on the study. Everyone concerned must know who is responsible for each part of the study as well as who has the authority for making the necessary decisions. If this is not done at the outset then there is a good chance that duplication of work may develop as well as arguments over who has the authority to do certain parts of the study.

Communication between and within each group is the key to the success or failure of the study.

Having set up the various committees, chosen a study director, and organized the study group it is now time to proceed with the transit study. The study should follow the flow chart shown in Figure 2. As can be seen a number of activities will be going on at the same time. It will be the study director's job to keep everyone informed of the progress and problems of the study group. Each section of the rest of the guidelines covers one phase listed on the flow chart.

Notes

¹ Ronald J. Hensen and William L. Grecco, An Information Manual on the Urban Transportation Planning Process for Technical Committees in Smaller Urban Areas (Joint Highway Research Project, Engineering Experiment Station, Purdue University, Civil Engrg. Bldg., Lafayette, Indiana 47907, February, 1970), p. 27.

² Robert L. Brunton and Jephtha J. Carrell, Management Practices for Smaller Cities (Municipal Management Series, The International City Managers' Association, 1140 Connecticut Avenue N.W., Chicago, Illinois, 1959), pp. 67-68.

³ Hensen and Grecco, p. 25.

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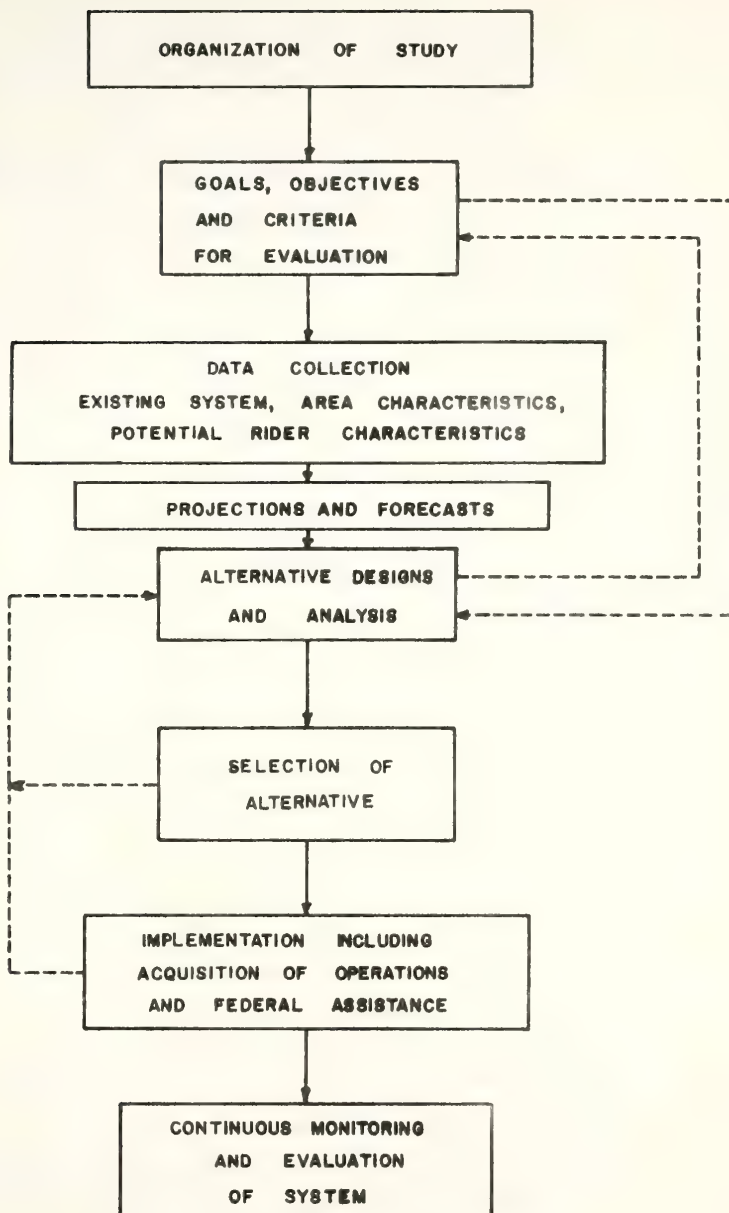


FIGURE 2
TRANSIT PLANNING FLOW CHART

CHAPTER II. ESTABLISHING GOALS, OBJECTIVES, AND CRITERIA FOR EVALUATION

The first step in establishing goals and objectives for transit in the community is to determine what goals and objectives, if any, have previously been established for the community. There are numerous places to look for community goals such as land-use and recreational development studies, transportation studies, social and environmental development studies, and economic and future growth studies. Various organizations should also be consulted such as the chamber of commerce, businessmen organizations, and other citizen organizations to determine what community goals they may have established for the groups they represent.

It is necessary to determine the existing community goals so that those formed for transit will be compatible. Every city should have an established set of goals to guide and coordinate its future development. Weiming Lu in his paper "Thoroughfare Planning and Goal Definition" lists four reasons for the development of community goals.¹

1. Goals clarify the difference between primary and secondary issues, thereby providing a clearer understanding of both.
2. They provide an opportunity for community and individual discussion of objectives, enabling citizens to participate in the planning process.

3. They give direction to public officials and private interests, enabling them to work in closer accord with community desires.
4. They constitute a step of agreement and understanding, upon which more detailed and extensive planning can be initiated.

It is beyond the scope of these guidelines to discuss the development of overall community goals. However, the following list of basic needs of people within a community was developed at a conference on Transportation and Community Values conducted by the Highway Research Board and should prove helpful in guiding the development of community goals.²

A. Basic Social Needs

1. Personal identity and recognition
2. Control over own destinies--a voice in decision-making; involvement and participation
3. A sense of community or belonging (at the local level)
4. Territoriality--identification with a bounded "turf" or neighborhood
5. A sense of being part of a united society at the metropolitan level
6. Compatible neighbors
7. Compatible playmates for children
8. Stability and security; lack of anxiety

B. Basic Environmental Needs

1. Clean air, unpolluted water, trash-free land
2. Low levels of noise and vibration
3. Conveniently situated local services: parks, schools, shops, churches
4. Compatible mixtures of land uses
5. Adequate shelter
6. Privacy
7. Uncongested transportation systems (in the locality)
8. Preservation of buildings and sites of unusual beauty or historical and architectural interests
9. Preservation of established neighborhoods
10. Environment allowing social contact within the neighborhood

11. Safety and security, especially for children
 12. Avoidance of commotion, such as during major construction
- C. Basic Access Needs
1. Access to employment, whether one has an automobile or not
 2. Access to the facilities and services of an entire city, whether one has an automobile or not; mobility, opportunity, and variety
 3. Low travel times
 4. Low travel costs
 5. Safety while traveling
 6. Reliable means of travel
 7. Comfort and convenience in travel
 8. Choice of mode of travel
 9. A transportation system that is comprehensible because it is orderly; one can find one's way around easily
- D. Basic Economic Needs
1. Avoidance of financial losses occasioned by the construction of transportation facilities
 2. Preservation of community tax base (municipal or county)
 3. Maintenance of economic stability of a community
 4. Low transportation costs, both capital and operating
 5. Encouragement of economic growth, especially for the lower income and minority groups

Establishing Transit Goals

Once the existing community goals have been determined, it is then possible to proceed with the development of transit goals. Much has been written concerning the development of goals and objectives and the procedures and persons to be involved in goals development.

Recently, a renewed emphasis has been placed on the use of "systems analysis" not only for developing goals and

objectives but for analyzing community problems and determining various alternative solutions. The use of systems analysis for problem solving implies that an interdisciplinary approach will be used; that is that the problem will be studied from all viewpoints. Not only from the engineers or planners viewpoint, but also from the viewpoint of the economist, the sociologist, etc.

Figure 3 is a diagram of the systems analysis process. From this diagram it is evident that the problem solution (alternatives) is dependent upon the objectives and criteria developed. Before proceeding with a discussion of who should develop the communities transit goals, it will be beneficial to define some of the terms that are used.

Systems Analysis: "it is a systematic attempt to provide decision makers with a full, accurate, and meaningful summary of the information relevant to clearly define issues and alternatives."³

Goals: "Goals are generalized statements that broadly relate the physical environment to values; but, because of their generality, no test for fulfillment may readily be applied to them. For example, the provision of equal opportunities for all members of a community, derived from the values of belonging and security, may be a goal toward which to strive. Because of the breadth and complexity of what is meant by "equal opportunities," it may be impossible either to fully achieve this ideal or to directly measure the degree to which it is achieved."⁴

Objectives: "An 'objective' is a specific statement that is the outgrowth of a goal. Objectives appear to be attainable and are stated so that it is possible to measure the extent to which they have been attained. Given the previously stated goal of equal opportunity for all members of a community, one transportation system objective might be that the cost of travel to work on public transportation be equal for rich and poor regardless of location in a community. As a measure of

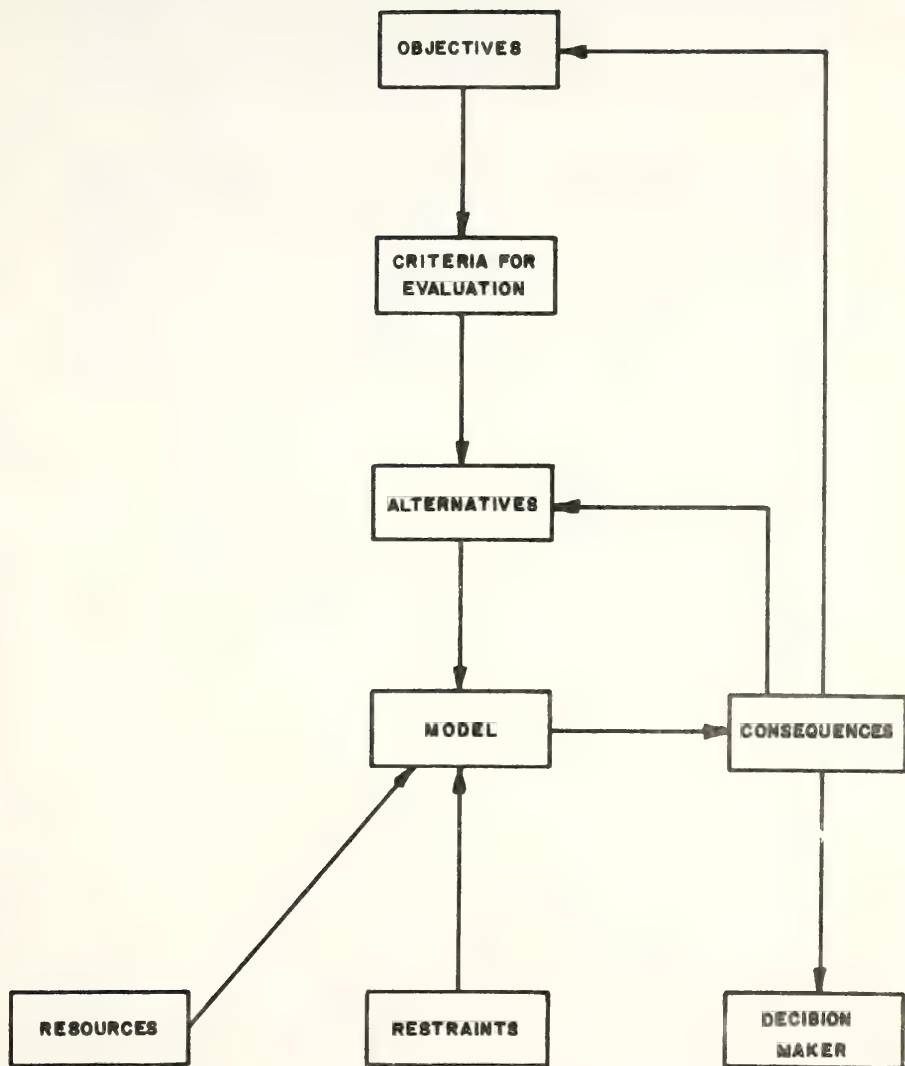


FIGURE 3
SYSTEMS ANALYSIS PROCESS

equality, the dollar cost of travel to work on public transportation during a time period compared with salaries during that period, determined on a sample basis, could be used. Defined in this way, equal cost for all residents is an objective because it is conformal with a goal, appears to be attainable, and is subject to objective measurement."⁴

Criteria: "Criteria" result directly from the fact that the levels of attainment of objectives are measurable. In a sense, criteria are the working or operational definitions attached to objectives. They are the measures, tests, or indicators of the degree to which objectives are attained. Criteria impart the quantitative characteristics to objectives and add the precision to objectives that differentiate them from goals. In the preceding example, equal transportation cost is the objective; the ratio of the cost of transportation to the salaries, the criterion."⁴

Standards: "One particular type of criterion, a 'standard,' is a fixed objective; i.e., the lowest (or highest) level of performance or attainment acceptable. A standard is a cut-off point beyond which performance is rejected. When they can be invoked, standards are useful because they can make routine the aspects of decision making to which they relate; all alternatives above or below the standard are routinely rejected."⁴

Determining transit goals and objectives according to the above definitions will accomplish two things. First, it will be of great help to the planning group in developing transit plans. Secondly, it will increase the probability that the plans once made will be implemented. It is hoped that by using a systems approach that most of the problems of transit will be analyzed. This means that there should be less public resistance to the final plans that are developed.

Who Should Establish Goals and Objectives?

At present, there are probably three answers to this question. They are the planners, the public, and the elected

officials. As might be expected there are advantages and disadvantages to each of the above answers.

The main advantage to having the planning group determine the transit goals and objectives is that they are more familiar with the alternatives available as well as the capabilities and consequences of each alternative. However, this may tend to make the goals they develop favor a particular solution. Less public criticism will probably develop if the planning group does not determine the goals and objectives for transit. The planning group should be encouraged to suggest possible objectives, criteria and standards for transit. The community transit goals should be determined by a group more representative of the community than the planning group.

From a purely democratic viewpoint it would be desirable to have the public determine the community transit goals and objectives. However, this would require such things as conducting group sessions with interviews conducted by the planning team, home interviews, some type of mail-in-questionnaire or possibly a referendum vote. In any case the cost would be great in comparison to the cost of the transit study. This would also considerably increase the length of time for the transit study.

Letting the elected officials determine the goals and objectives can be expedient and may seem to be representative. However, elected officials tend to stress short range goals

due to the short period between elections.

In most small cities the transit study will be restricted by a lack of time and money. Therefore, it will probably be necessary to compromise on the process for determining the transit goals and objectives. In this compromise situation it would be best to determine what group will actually approve or disapprove the final transit plans.⁵ The main objective for the planning group is to develop a plan that will be implemented. To insure this it is necessary that the transit plans are developed according to goals and objectives that meet the approval of the community's decision makers. In most small cities this will mean the elected officials. The main idea here is to get a good representation of the community as well as the community influentials involved in the goals determination process.⁶

Thus, a good compromise solution for determining goals and objectives might be to let the policy committee and the citizens advisory committee work together to develop the goals and objectives. However, the final decision as to how the communities goals and objectives are to be determined must rest with the decision makers.

Considerations in Establishing Transit Goals and Objectives

A. Transit goals and objectives must be established to complement existing community goals. This means considering such things as population and economic projections, the number of people attracted to the area such as tourists,

conventioners etc., and desired land-use patterns. Also, if the area is auto oriented it must be determined if the city is to remain that way in the future.

B. What type of service is desired? Is the transit service to be profit-motivated, subsidized, or possibly a break-even operation? The answer to these questions will effect the quality and extent of service as well as the amount of financing that will be needed.

C. What people are to be served? Just those to young or old to drive? Just persons not owning a car? It will be necessary to decide who is to be served as well as the areas of the city to be served and the extent of service to these areas. The question here is really one of accessibility. That is, what areas should be accessible to what people and to what extent?

D. Is transit service to be CBD (central business district) oriented? Is transit to serve all areas of the city to the same extent or are certain areas such as the CBD to receive greater emphasis. This may well depend on the economic desires and land-use patterns of the community. The answers to these questions well depend on the value that transit is to have to the community. Will it serve the business sector, the school system, the economically deprived, the unemployed, etc?

E. What financing is desired by the community? This is an extremely important question for it may determine the

quality and extent of service that can be provided. The city has numerous options open to it. The city may own the operations but lease them to a private operator. Under this set up a subsidy may or not be needed for the operation of the system, however in all probability it will be needed in order to periodically replace equipment.

A second alternative would set up transit as a city department. In this case a subsidy would probably be required to cover any losses incurred by the system.

A third alternative would be to establish a transit authority to operate the system. Depending on the state laws governing this situation, the authority may have the power to set up a taxing district to support the operations.

There are probably other possible alternatives for city operation of transit but these are the three major types in use today. In most cases, especially in small urban areas, a subsidy will be necessary in order to provide good transit service. The size of this subsidy will depend on the quality and extent of service as well as the amount of community support given the system once in operation. If the system is able to increase ridership by providing good service then only a small subsidy may be needed to aid in the periodic replacement of equipment.

Another thing that will affect the size of the subsidy, will be the amount of money needed to improve the capital equipment of the existing operations. Up to two-thirds of

these funds may be obtained from UMTA (Urban Mass Transportation Administration) if the city can meet their requirements. These requirements and the process for making application are discussed in the chapter on Acquisition of Transit Operations by a City.

The above discussion was not meant to provide an extensive coverage of all factors affecting the establishment of transit goals and objectives. Every community will have different goals and objectives for transit depending on the aspirations of the community.

In order to aid in the establishment of goals and objectives the following examples are provided. It is emphasized that these are only examples and should not be copied by any community.

General Transportation Goals, Planning District Two, Twin Cities Metropolitan Planning Commission.⁷

1. A convenient, safe, and efficient transportation system providing for local movement as well as accommodating through-traffic in the district.
2. A transportation system that effectively accommodates personal, commercial, industrial, and public needs at all times of the day, week, and year.
3. A circulation system that effectively serves all age and economic groups, with a transit system to augment the road system carrying private vehicles and a comprehensive walkway and bicycle trail system in areas of urban density.
4. A total circulation system that can be economically maintained and effectively open for needed service under all conditions.
5. A transportation and circulation system designed and staged to encourage development to go when

and where desired and to accommodate projected growth.

The following general transportation and transit goals were suggested by Littleton C. MacDorman and Joseph M. Goodman in their paper "The Case for Bus Transit in Urban Areas."⁸

Improved transportation service to alleviate the peak period highway overloads.

Transportation service to a relatively large segment of the population, such as the poor, the aged, the young, or the infirm, who do not have access to an automobile or are unable to use one.

Short-term transportation service to developing areas or to socially or economically deprived areas, without lengthy planning periods or high capital expenditures.

A flexible means of public transportation that can adapt quickly and economically to changing socioeconomic and land use patterns.

Minimum-level transportation service in small communities in order to maintain a viable community identity and cohesiveness.

The following transit goals were suggested for a publicly owned, service-oriented transit system in "Mass Transit Management: A Handbook for Small Cities" which was compiled by the Institute for Urban Transportation of the Graduate School of Business at Indiana University.⁹

- (1) Provide transportation services to those without an automobile.
- (2) Help relieve traffic congestion.
- (3) Minimize use of land for parking.
- (4) Increase interaction between all parts of the community.

- (5) Aid in shaping community development toward ends established in comprehensive planning.
- (6) Help reduce the costs of transportation to the community and its residents.
- (7) Enhance the image of the town.
- (8) Extend the labor market and increase job opportunities available to workers.
- (9) Help maintain downtown property values through improved access.
- (10) Attract new business to the area.

The above examples only list goals. Each goal would have a number of objectives designed to try and fulfill that goal. Also, each objective would have a number of criteria designed to measure the fulfillment of each objective. This process is shown in Figure 4. As can be seen two goals may have the same objective and two objectives may have the same criteria. Also, the diagram shows that the goals must be developed from community values. Since this is true, it is possible that conflicting goals, objectives and criteria may develop. In this case the decision makers must determine which goals, objectives, and criteria are most important to the community.

It is hoped that great emphasis will be placed on the establishment of transit goals and objectives that adequately represent the values of the community. Only through the use of representative goals and objectives can the study group develop transit plans that will successfully meet the needs of the community.

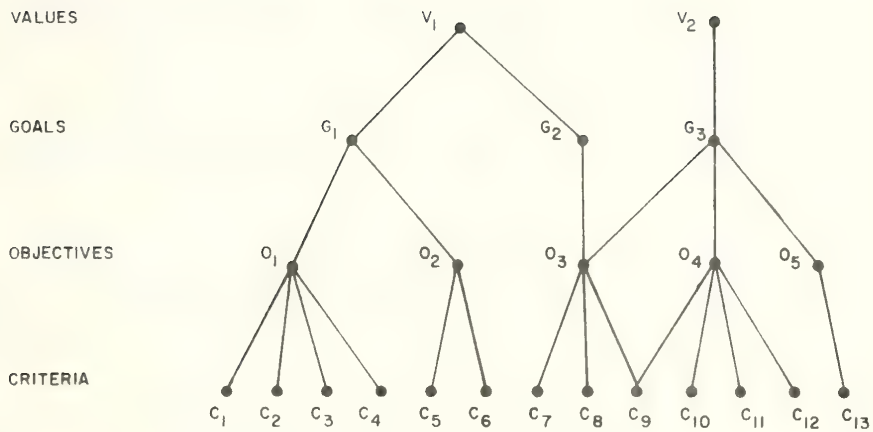


FIGURE 4

HIERARCHICAL INTERRELATIONSHIPS
AMONG VALUES, GOALS, OBJECTIVES, AND CRITERIA¹⁰

Notes

¹Weiming Lu, "Thoroughfare Planning and Goal Definition," Traffic Quarterly (April, 1963), p. 238.

²Highway Research Board, Special Report 105, Transportation and Community Values (2101 Constitution Avenue, Washington, D.C. 20418, 1969), pp. 6-7.

³Alain Enthoven, "Systems Analysis and the Navy," Planning Programming Budgeting: A Systems Approach to Management, Edited by F. J. Lyden and E. G. Miller (Markham Publishing Co., Chicago, Illinois, 1968), p. 265.

⁴Edwin N. Thomas and Joseph L. Schoefer, Strategies for the Evaluation of Alternative Transportation Plans (Highway Research Board, National Cooperative Highway Research Program, Report 96, 2101 Constitution Avenue, Washington, D.C. 20418, 1970), p. 40.

⁵Raymond H. Ellis, Meeting Preprint 1482, Transportation Planning: Myths and Realities (American Society of Civil Engineers, 345 East 47th Street, New York, New York 10017, July, 1971), pp. 10-11.

⁶Charles C. Schimpeler and William L. Grecco, "Systems Evaluation: An Approach Based on Community Structure and Values," Highway Research Record, No. 238 (Highway Research Board, 2101 Constitution Avenue, Washington, D.C. 20418, 1968), p. 130.

⁷Twin Cities Metropolitan Planning Commission, Planning District Two, Report No. 2, Recommended Goals and Standards (550 Cedar Avenue, St. Paul, Minnesota 55101, 1968), p. 16.

⁸Littleton, C. MacDorman and Joseph M. Goodman, "The Case for Bus Transit in Urban Areas," Management Controls (Peat, Marwick, Mitchell and Co., 345 Park Avenue, New York, New York 10022, March, 1971), p. 61.

⁹Institute for Urban Transportation, Graduate School of Business, Indiana University, Mass Transit Management: A Handbook for Small Cities, Director George M. Smerk (Bloomington, Indiana, February, 1971), pp. 4-5.

¹⁰Thomas and Schofer, p. 42.

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Midwest Research Institute, Special Transportation Requirements in Small Cities and Towns, U.S. Department of Housing and Urban Development, Washington, D.C., May, 1968.

Research and Policy Committee, Committee for Economic Development, Developing Metropolitan Transportation Policies: A Guide for Local Leadership, 711 Fifth Avenue, New York, New York 10022, April, 1965.

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CHAPTER III. DATA COLLECTION AND ANALYSIS

-- EXISTING SYSTEM

Before the necessary data can be collected and analyzed by the study group, a number of decisions need to be made and tasks need to be done.

1. Existing data should be located and analyzed.

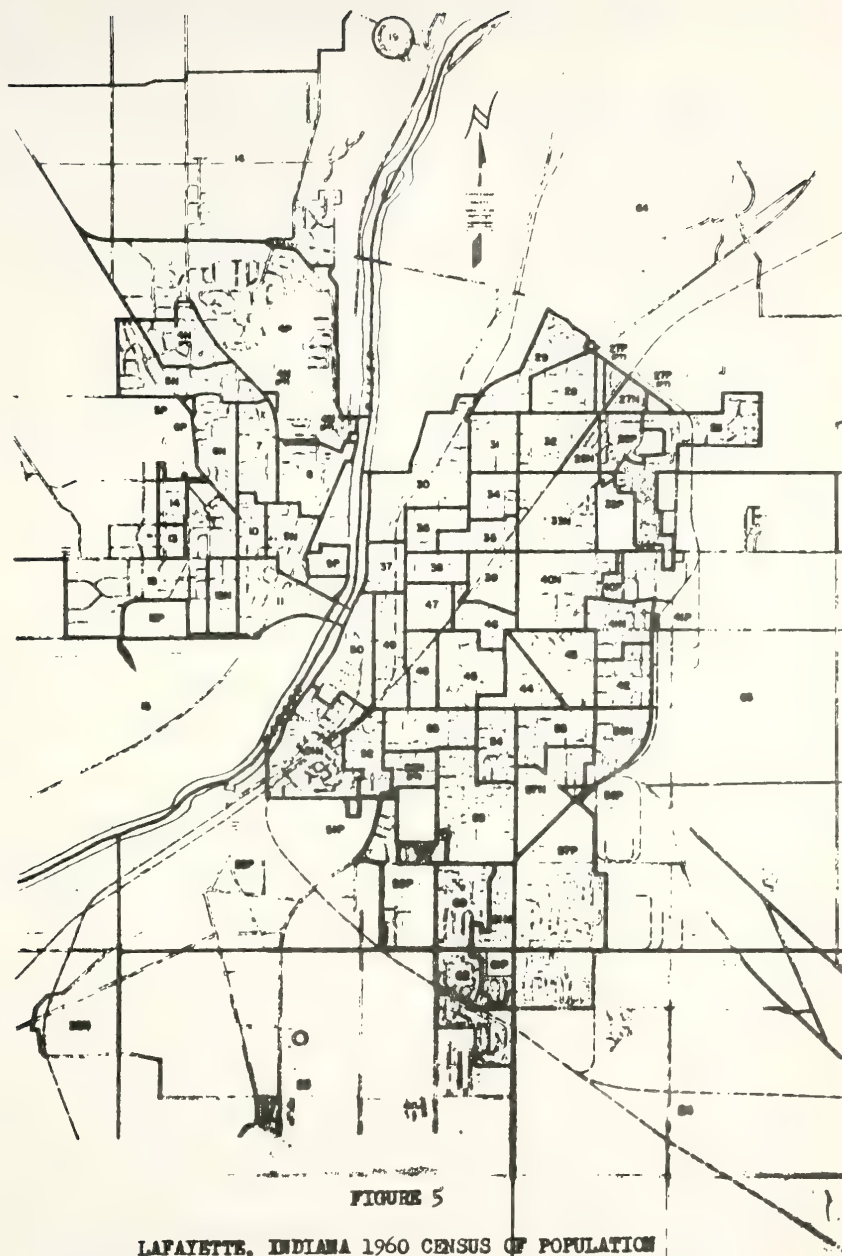
Potential sources of data would be transportation or land-use studies, population and economic studies, recreational and general development studies, and any other studies or surveys that may have been conducted in the last ten years. An analysis of these data will determine how much may be used in the transit study. The use of existing data will reduce the time and effort for the transit study as well as the cost of data collection.

2. A decision must be made as to how the data are to be coded and tabulated. This means determining the boundary of the study area and then breaking this area up into zones or districts for analysis. There are a number of ways of doing this. If the city is over 50,000 in population and has been tracted for the United States Census then the census tracts may be used. However, in most cases the tracts contain about 4,000 residents which may constitute a large area in smaller cities. Therefore it may be necessary to

divide the census tract into two or three parts for analysis. In dividing up the census tracts avoid splitting blocks and where possible avoid splitting up neighborhoods. Generally, the tracts can be split by using streets as boundaries. The reason for using census tracts is that all the census data are tabulated and reported by tract for those areas that have been tracted. This information could be very useful in the transit study.

If the city is under 50,000 in population and has not been tracted for the United States Census, then it is possible to use census enumeration districts for the zones or districts for the transit study. These districts contain about 800 residents. Figure 5 is an example of the enumeration districts in Lafayette, Indiana in 1960. The reason for using enumeration districts is that all the census data collected at the 100 per cent level are tabulated and reported by enumeration districts for those areas that have not been tracted. This information will be very useful in the transit study. Maps of the census tracts and enumeration districts can be obtained from the Bureau of the Census in Washington, D.C.

If a transportation study has been conducted and used zones which do not correspond to the census tracts or enumeration districts, it may be more advantageous to use these zones so that the data collected may be used in the transit study. This decision will depend on the value the study



group places on the data collected in the transportation study.

3. Once the area has been divided into zones for analysis, it is necessary to decide how the data are to be tabulated. Generally, the data will be coded according to the zones to which it pertains and the information punched on computer cards. These data are then tabulated for each zone. This tabulation can be done by hand for the smaller cities, however, if computer facilities are available it is possible to tabulate the data by use of the computer.

Origin and Destination Data of Riders

The main objective in collecting origin and destination data is to determine where present transit riders are coming from and where they are going. Also, it is desirable to obtain some limited socio-economic data on the transit riders. Generally, the origin and destination data are obtained through a short on-board questionnaire completed while the rider is on the bus, the questionnaire must be short, usually no longer than 15 questions, and take little time to complete, usually less than 5 minutes. If a larger amount of data is desired on transit riders it must be acquired through a mail-in type questionnaire or through a home interview conducted in person or over the telephone.

Generally, origin and destination data on transit riders will not be available from other sources and it will be necessary to conduct a survey of transit riders in order

to obtain the desired information. The first task in preparing for the origin and destination survey (O-D survey) is to determine the type of data desired. Obviously, it will be necessary to obtain the riders trip origin and destination. However, other important data are also desirable such as, distance from place of boarding transit vehicle to origin of trip and distance from place of departing vehicle to trip destination, type or purpose of trip, age of rider, number of persons in household, availability of auto, possession of drivers license, etc. The additional information collected will depend on what information is felt necessary for analysis of the present transit system as well as the type of information available from other sources. Sample questionnaires are provided in Appendix A and should prove helpful in determining the type of information necessary as well as the structure of the questionnaire.

Each piece of data collected in the O-D survey should serve some particular purpose in order to warrant the time and money spent in collecting and tabulating it. There are numerous reasons for collecting data, a few of which are discussed below.

1. It is necessary to find out where people are coming from and where they are going. It is necessary to find out if the present system is adequately serving the present ridership. From the O-D data it will be possible to determine which zones are generating a high ridership and those zones producing low ridership.

2. It is also necessary to determine the type of ridership such as the age distribution, income distribution, general occupational breakdown, etc. It will be useful to know if only a captive ridership exists; that is, those with no alternative means of transportation.

3. It will be useful to determine the number of persons having to transfer from one bus to another in order to complete their trip. This information will be helpful in making necessary route changes for the existing system or possibly in establishing new routes for a new system.

4. At the same time that the O-D survey is conducted, a load data sheet will be filled out. A sample load data sheet is provided in Appendix A. On this sheet will be recorded the number of persons boarding and alighting at each stop as well as a running total of those riders on the bus. This information will be useful in determining the maximum load points for each route which will determine the size of vehicle necessary to adequately meet ridership demands. This information will also be useful in making route changes or planning new routes.

It will be up to the study group to decide what data will be collected on the O-D survey. This decision will be based on the information needed for analysis that is not available from other sources. A decision should also be made at this time as to whether a mail-in questionnaire or some type of home interview will be used to obtain additional socio-economic data on transit riders. If this type of

survey is to be conducted, it may be possible to reduce the number of questions on the on-board O-D survey questionnaire. If a mail-in or home interview is not performed it will be necessary to have a longer on-board O-D questionnaire. The development, distribution, collection, and tabulation of a mail-in or home interview questionnaire are discussed in a later section of this chapter.

After determining the data to be collected in the O-D survey, it will be necessary to design the questionnaire. Designing a good questionnaire is not an easy task and should be the work of a number of individuals. Some general guidelines are listed below.

1. The questions should be self-explanatory. This means avoiding technical terms and words that most transit riders would not understand or that would not be familiar to them.

2. The questions should be easy to answer. Where possible a choice of answers should be provided with the interviewee indicating his answer by circling, checking, or underlining his choice. Whatever method is chosen should be used as much as possible throughout the questionnaire to avoid confusing the interviewee.

3. Questions should not be crowded together and should be printed in large enough print so as to be easily readable.

4. On a short questionnaire it will not be necessary to worry about a boring questionnaire, but questions should be arranged in an orderly manner. For example ask the place of origin before asking for the destination etc. If a "touchy question" such as family income is used it should be placed toward the end of the questionnaire. Sometimes a person will stop answering the questions when confronted with a "touchy question." However, if the questionnaire has been partially filled in and then turned in, the information, particularly the O-D information, may be useful even though all of the questions have not been answered.

5. Generally, a very brief statement of the purpose of the study is provided at the beginning of the questionnaire.

6. If space is available, it is a good idea to provide a place for comments. Riders like to feel that the study group is interested in their opinions.

In designing the questionnaire it will be helpful to go over the sample questionnaires provided in Appendix A. After the questionnaire has been designed it will be necessary to pre-test it. The best way to do this is to administer it to 15 to 25 transit riders on several different routes. From this pre-test it will soon be evident as to what questions are unclear and those that may not be answered. After the pre-test it will be necessary to re-work the questions that were unclear. The re-worked questionnaire

should then be pre-tested again to see if the initial problems have been overcome and to make sure that no new problems have been developed. Generally, two pre-tests are all that will be necessary. However, if the study group is not satisfied with the results of the second pre-test, it will be necessary to re-work and pre-test the questionnaire until the results are satisfactory.

Data Collection

After the questionnaire has been designed, it is necessary to determine the sample size to be surveyed. Once the sample size has been chosen the number of questionnaires needed for each route can be calculated. There are a number of things to consider before deciding what sample size should be used.

1. One of the first considerations should be determining the number of personnel that will be available to assist in conducting the O-D survey. Generally, there should be at least two people assigned to each bus that is being sampled. One person will take care of the load data sheet while the other one hands out questionnaires and answers any questions that might come up. After the load data is recorded at each stop the person in charge of that task can then assist in the distribution of questionnaires. During off peak hours and where low ridership exists, one person may be able to handle the load data sheet as well as the distribution of questionnaires.

2. An estimate of ridership per route should be obtained. This can be calculated from the daily revenue for each route. Generally, the route revenue is divided by the average fare to determine the number of riders. The average fare will depend on the fare structure being used by the transit system. There usually is a standard fare for each trip. (Lafayette for example is 30 cents.) There also may be reduced fares for school children and the elderly (say 25 cents). The average fare will then be somewhere between the standard fare and the reduced fare. This information will be helpful in determining the number of questionnaires necessary for each route as well as the number of personnel needed to administer the questionnaires.

3. Another consideration would be the time required to complete the survey. Is it desired to collect all the data in one day or over a period of days or weeks? The shorter the time period is for the collection of the data the larger the number of personnel that will be needed.

In determining the sample size the number of riders will be a determining factor. Generally, the smaller the ridership the larger the percentage sample size must be. In the areas for which these guidelines were written, the ridership will generally be low usually consisting of captive riders. It is necessary in this situation to obtain a fairly large percentage sample in order to obtain a sufficient number of trip origins and trip destinations in each zone for

analysis. An example which the author is familiar with, was the transit O-D survey conducted in Lafayette, Indiana in the fall of 1970.

The cities of Lafayette and West Lafayette along with Purdue University contain a population in excess of 100,000. At the time of the O-D survey there were four transit routes being used. A total of six buses were in use, two of the routes having two buses operating on them. The daily ridership was about 1500 riders. An attempt was made to obtain a 100 per cent survey of the riders. The survey was conducted in one day beginning with the first buses in the morning until shut down that night. After the survey had been completed, a check against the load data sheet and revenue for each route for the survey day indicated that about 10 per cent of the riders had been missed.² Some of this 10 per cent was due to refusals to fill out the questionnaire. However, the largest portion of the 10 per cent was due to students that were missed, because large numbers of them boarded at schools and then rode only a short distance.

The end result was that 1372 on-board questionnaires were completed.³ This is not a large number for analysis in an area the size of Lafayette and West Lafayette. Had a smaller sample been taken the results may not have been very useful for analysis purposes.

The decision as to sample size must be made by the study group. It is not proposed that a 100 per cent sample

be taken, but that a significant number of responses be obtained in relation to the size of the area being surveyed. Truly, this is a judgment decision and must take into account a number of the considerations mentioned earlier.

Once the sample size is chosen, there are numerous tasks that must be completed before the survey can take place.

1. The number of personnel needed to conduct the survey must be determined. This will depend on the length of time used for the study. The study should be conducted on a "typical day" which is usually a weekday. A number of studies have used either a Tuesday, Wednesday or Thursday and have omitted Monday and Friday feeling that they were not "typical" because many workers stayed home on these days. This has never been confirmed to any great extent and therefore any weekday will probably yield satisfactory results. Days to avoid would be days that the banks close early or when a significant number of businesses or employers are closed. Not only is a "typical day" needed but also a "typical month." It is usually recommended that the survey be conducted in the early fall or spring. Not only does this provide better weather but also it avoids the loss of ridership due to vacations which normally are taken in the summer.

There are a number of ways to spread out the survey. One route can be surveyed on each day. Also every other bus

on a route can be surveyed. The method used will depend on the sample size desired as well as the number of personnel available.

2. The personnel must be briefed as to how the survey is to be conducted. They must know how to fill out the load data sheet as well as being able to spot check the completed questionnaires for accuracy. Also, it is beneficial to instruct them on how to assist people in filling out the questionnaire without biasing their answers. They must also be instructed as to how to handle refusals as well as antagonistic statements and questions that might come from riders that are skeptical of the survey being conducted.

3. The questionnaires should be numbered and coded according to the route on which they are distributed. This will aid greatly in the coding and tabulation of the data.

4. A system must be worked out for relieving survey personnel. A schedule should be made up so that everyone knows his assignment, time and specifically his duties. Supervisors should be in the field during the survey to make sure everything is going according to the schedule. They should be provided with extra questionnaires, load data sheets, pencils, etc. Also, stand-by personnel should be available in case someone becomes sick or is hurt. If the routes meet at a common point such as the central business district, the supervisors can make their periodic checks at this point. All aspects of the survey must be worked out in advance.

5. The public should be kept informed as to what the study group is doing. Periodic news releases can be sent to the local newspapers and radio and television stations. A few days prior to the O-D survey, an announcement should be made by all media as to why the survey is being conducted, the day and time as well as the routes being surveyed. The more information that is given to the public the better the cooperation that can be expected.

6. Throughout this time period the study group must work with the transit company personnel particularly the drivers. Not only should the drivers be informed as to what is happening but their suggestions should be encouraged. It is very beneficial to have the drivers behind the survey. They can help greatly by preparing their riders for the survey and encouraging their cooperation.

7. All the personnel connected with the study should have some form of visible identification. This will avoid confusion as to whether or not they should be on the bus.

In preparing for and conducting the O-D survey, the important thing is communication and cooperation. Everyone involved must be informed as to what is happening, when, where, and why. If a concerted effort is made to keep everyone informed before and up to the survey day, it should insure a smooth and successful survey.

Coding and Tabulation of Data

After the survey has been completed it is time to begin coding and tabulating the data. If a mail-in or home interview questionnaire of transit riders is being used, it may be necessary to wait until these are returned before coding and tabulation is started. Generally, if a mail-in or home interview questionnaire is used it will be coded to correspond to the O-D questionnaire filled out by the transit rider. In this way the two questionnaires can be coordinated and the data tabulated together. A more detailed discussion of this procedure is contained in the section on Rider Characteristics.

It is advisable to have all the survey data recorded on computer punch cards. This will aid in the handling and analysis of the data. Each questionnaire will have at least one punch card and possibly more depending on the amount of data to be recorded. Recorded on the punch card will normally be the questionnaire identification number which will indicate the route to which the questionnaire pertains. The questionnaire will then be coded to the zones of origin and destination. The questionnaire data will then be punched on the card in the columns designated for the answers to each question. Generally, this information is taken from the questionnaire and placed on computer coding sheets from which the key punch operator can punch the cards. In some cases such as the San Diego Transit Questionnaire in Appendix A the computer columns are listed on the questionnaire.

Then question answers are transferred to the columns and the key punch operator can punch the cards from the questionnaires. In other instances the answers can be punched on the cards directly from the questionnaire without transferring the answers. An example of this type of questionnaire is the Iowa City Area Transportation Study--Transit User Survey in Appendix A.

If it is necessary to code each questionnaire and to transfer the answers to computer coding sheets, then each person doing the coding must be well versed in the coding procedure being used. Spot checks should be made of each coder's work to insure accuracy. The punched cards should also be checked to make sure that the data has been punched in the right columns. A sample of the coding procedure used in the transit survey in Lafayette, Indiana is provided in Appendix B.

Once the data are punched, the cards can then be sorted for tabulation of the data. There are two ways of sorting and tabulating the data. Computer programs are available to sort and tabulate the data. The type to be used will depend on the computer equipment and personnel available to the study group. These programs should not be used unless capable personnel well versed in computer operations are available to perform the data tabulation.

The second method for data tabulation takes longer but it is easy and inexpensive. The cards are sorted

according to zones by the use of a card sorter. A sorter generally has ten sort compartments, nine for sorting by a specific column or number and the tenth for the left over cards. Thus, if there were 90 zones it would take ten separate sorts to divide the cards into zones. After the cards have been sorted into zones it is then possible to sort each zone according to certain columns. In this way a tabulation of each data entry can be made. This method was used in the study in Lafayette, Indiana and was felt to be satisfactory.

After tabulation, data can be recorded in tables, graphs and on maps for further evaluation. It is very helpful to show the data by zone on a map of the area. In this way it will be easy to see what areas are being served by the present transit system and those zones not being served. These data can then be compared with the data collected on persons not using transit. The presentation and analysis of data is discussed in the chapter on Forecasting and Data Presentation.

Rider Characteristics

As was pointed out earlier, it might be desirable to obtain additional information from present transit riders that could not be obtained on the short O-D questionnaire. There are a number of data items that might be requested, such as, additional socio-economic data. Generally, the majority of the information requested will concern possible

changes in the present transit system. Information on type of system, fares, operating times, activity centers to be served, and other information could be collected to obtain public reaction to the study group's ideas for possible system changes.

There are a number of ways that these data can be collected. The most inexpensive method would be to use a mail-in questionnaire. This questionnaire would be handed out with the O-D questionnaire and would be coded with the same number as the O-D questionnaire to aid in coding the mail-in questionnaire to the study zones. Generally, the return rate is very low (20-30 per cent). However, if the riders are informed of the importance of the information to the study group it may be possible to increase the return rate. In the Lafayette study a 51 per cent return rate occurred indicating a high interest on the part of the transit riders.⁴

Another method for collecting these data would be through a home interview. This can be done in two ways. An interviewer can be sent to the home or he can call on the telephone. If the interview is conducted over the phone it must be fairly short. Both methods are costly with the in-home interview being the most expensive. Due to the high cost of these methods they are not recommended for use in collecting this type of data.

If it is decided to use a mail-in questionnaire, it must be designed in the same manner as the O-D questionnaire.

It can be longer but it still must be self-explanatory. Since, the questionnaire will be longer an attempt should be made to vary the questions not only by topic but by the method for answering them. This is desirable in order to keep the interviewee from becoming bored. This questionnaire will probably have a number of open ended or short answer questions which will make the coding process a little harder but it will provide for a variety of answers and opinions. A sample mail-in questionnaire from the Lafayette study is provided in Appendix C.

A stamped and addressed return envelope should be provided with each questionnaire. Generally, a mailing permit can be obtained from the postal department. The permit number is stamped on the envelope; in this way postage is paid only on questionnaires that are returned. However, the return rate is usually higher if a stamped envelope is used.

The information received in the mail-in questionnaire will be coded and tabulated for computer input in the same manner as the O-D data (see Appendix B). The returned mail-in questionnaires should be correlated to the O-D questionnaire with the same number so that the data can be compared and assigned to a study zone for analysis.

System Characteristics

Most of the necessary data on the present system can be obtained from the transit company records. A number of

data items are desirable in order to plan for changes to the transit system.

1. A map should be obtained of present routes. Also, a schedule showing headways, location of stops and time of stop should be obtained. From this information it will be possible to determine transfer points and also the extent of transit coverage in the area. Coverage is generally determined by including the area one-quarter mile on each side of a route. If this area is shaded in on a map of the city it will determine those areas not presently within the one-quarter mile service area.

2. Information should be obtained on the existing maintenance system. This would include items such as a rotation schedule for routine service as well as the procedure for performing major repairs. It would also be useful to determine what type of parts are kept in stock as well as where parts and other service supplies are obtained. This information will be helpful in making changes in the system in order to increase efficiency and decrease costs.

3. Data on special services provided by the transit system should be obtained. This would include charter service as well as the transporting of school children by special buses. This information will be necessary to determine what services should be continued and those to be terminated.

4. In order to make an analysis of the system it will be necessary to obtain some economic data. The revenue from the system by route should be obtained. A number of graphs should be made from this information. A plot of daily revenue by route can be made for a period of three or four months. Also, monthly revenue for the whole system can be plotted for a number of years to obtain a picture of the past revenue trends of the system. The form and amount of information available will determine what analysis can be performed. Figures 6 and 7 show examples of how data might be presented. A good source of information would be income tax records, which should be available from the transit company.

Data on operating costs should be obtained, such as cost of fuel, drivers wages, maintenance costs, depreciation costs, etc. As much economic data as possible should be obtained in order to analyze the present system to see where changes can be made. An example of the type of economic data collected in previous transit studies is presented in Tables 1 and 2.

5. An inventory of all equipment and property should be made. This will include a complete run down on the age and condition of each piece of rolling stock. See Table 13 in the chapter on Acquisition of Transit Operations by a City. This information will be beneficial in planning for the purchase of new equipment and the retiring of wornout equipment.

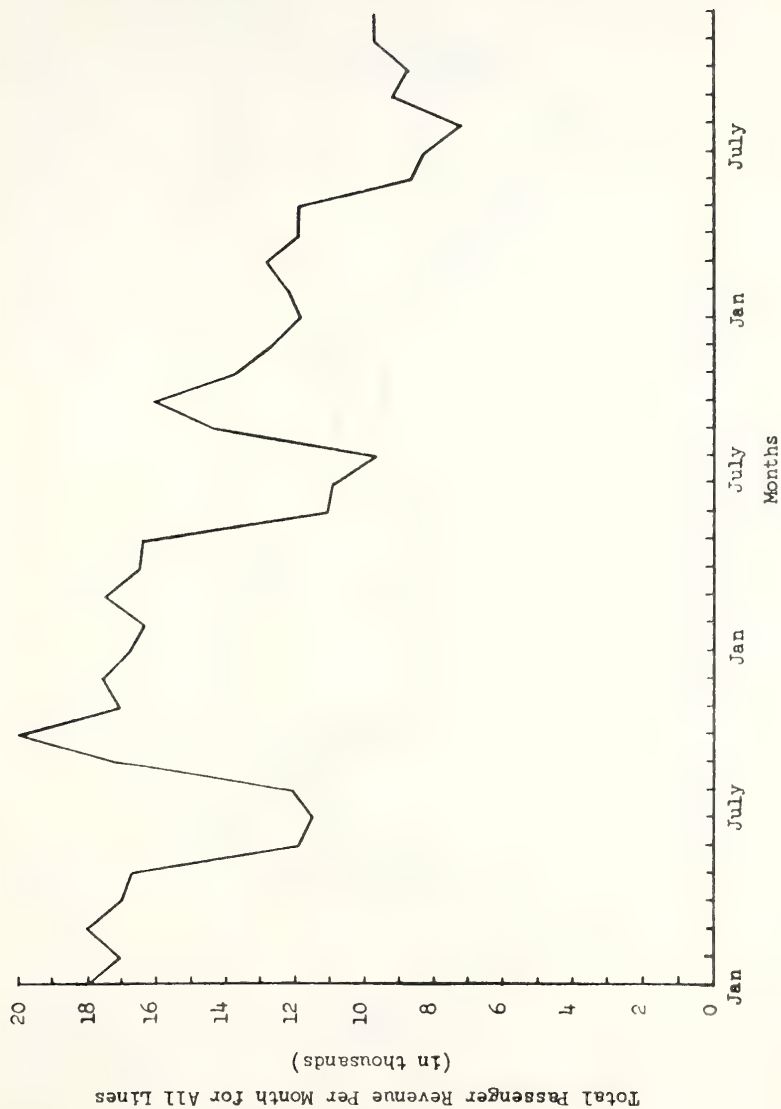


FIGURE 6

MONTHLY PASSENGER REVENUE (1968-1970) - GREATER LAFAYETTE BUS COMPANY ⁵

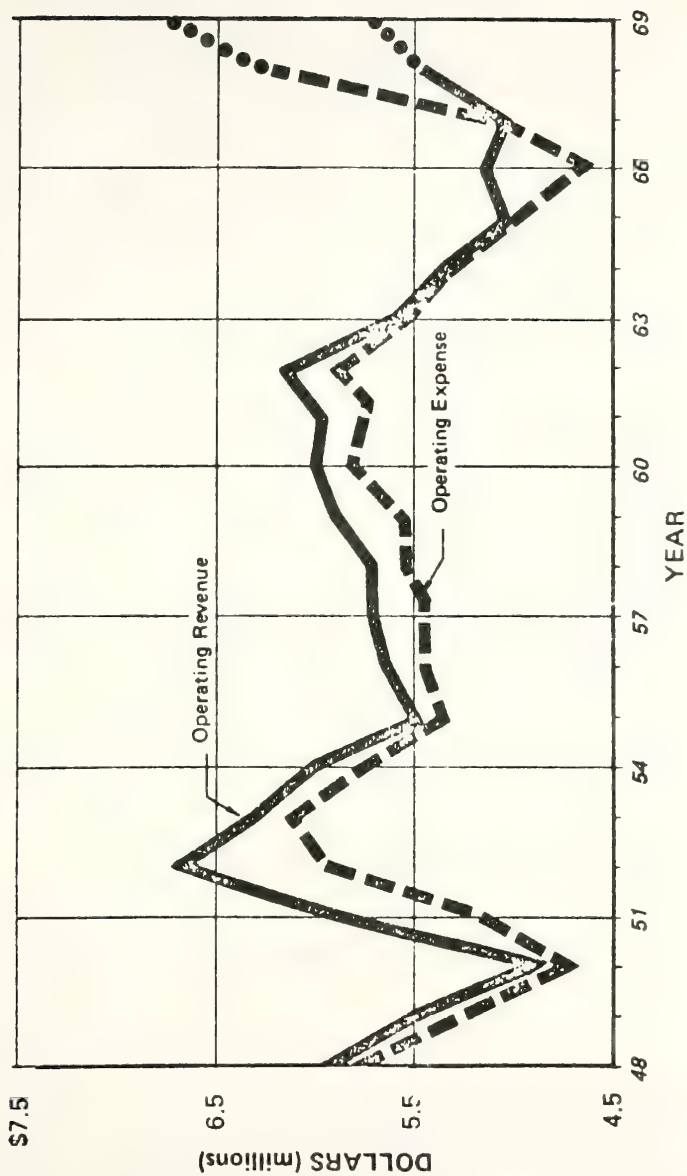


FIGURE 7

SDTC OPERATING REVENUE AND OPERATING EXPENSE (1948-1969)⁶

TABLE 2
SUMMARY OF REVENUE AND OPERATING EXPENSES
SPOKANE CITY LINES

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968 (7 mos.)	1969
OPERATING REVENUE											
Passenger	\$1,256,790	\$1,225,080	\$1,171,080	\$1,147,695	\$1,180,435	\$233,408	\$1,175,548	\$1,103,943	\$1,111,855	\$471,772	\$851,487
Charter	7,175	7,737	5,503	25,684	6,894	14,242	48,465	23,733	49,108	6,156	4,170
Advertising	8,498	6,395	9,542	6,924	8,617	8,859	6,323	8,036	7,113	107	8,203
City Portion (from Transit Tax)											
Total Revenue	1,274,463	1,241,212	1,186,125	1,180,303	1,195,946	256,509	1,230,336	1,135,732	1,209,118	609,997	1,443,049
Revenue Per Mile	55.13	53.22	51.55	52.66	53.71	55.79	56.02	59.35	62.67	59.02	68.32
OPERATING EXPENSES											
Expense Per Mile	1,126,524	1,122,611	1,109,013	1,107,585	1,155,606	185,430	1,166,100	1,094,540	1,146,663	757,314	1,366,352
Operating Profit	147,939	118,601	77,112	72,718	40,340	91,079	64,236	39,192	60,255	(57,317)	76,697**
Profit/Loss Per Mile	6.40	5.09	3.32	3.24	1.81	4.04	3.03	2.05	3.12	(4.83)	5.06
Net Income After Taxes	80,855	61,945	43,786	49,101	31,703	60,767	46,521	38,218	56,285	(29,342)	
Income Per Mile	3.50	2.80	1.87	2.19	1.42	2.70	2.19	2.00	3.02	(2.47)	

1/ 1968 represents only seven months operations due to strike.

*Includes \$41,042 in additional contract charter revenue.

**This represents a surplus rather than a profit.

NOTE All "Per Mile" costs are in cents.

6. An analysis of the present form of management should be made. This will include determining the number of administrative personnel and the duties and responsibilities of each. This information will be used to determine if changes need to be made in the form of management. Items to be considered would be the qualifications necessary for each position as well as the attitude of the personnel toward the present system. It would also be useful to determine the drivers' attitude toward the system and toward the present management organization.

The amount of data collected on the characteristics of the present transit system will depend on the time available, the number of personnel available, and the money available for this part of the study. Generally, the more pertinent the data that is obtained, the easier it will be to determine the changes that will improve the transit system's efficiency.

Notes

¹ Stephen W. Ricks, A Synthesis of Urban Travel Patterns in Metropolitan Lafayette, Indiana (Joint Highway Research Project, Engineering Experiment Station, Purdue University, Civil Engineering Building, Lafayette, Indiana 47907, October, 1965), p. 34.

² Joint Highway Research Project, Purdue University, The Greater Lafayette Area Bus Transit Study, Project Director Kenneth W. Heathington (Civil Engineering Building, Lafayette, Indiana 47907, April, 1971), p. 24.

³ Ibid., p. 31.

⁴ Ibid., p. 62.

⁵Ibid., p. 38.

⁶Comprehensive Planning Organization, Job Number 6103, Transit Survey (801 Co Administration Center, San Diego, California 92101, March, 1970), p. 24.

⁷Joint Highway Research Project, p. 180.

⁸Alan M. Vorhees and Associates, Inc., 5252 Balboa Avenue, San Diego, California 92117, A Transit Development Program for Spokane (Prepared for the City of Spokane, Washington, May, 1970), p. 33.

CHAPTER IV. POTENTIAL RIDERS AND AREA CHARACTERISTICS

In most areas for which this report was written, the transit ridership will consist mainly of captive riders. In this situation, it is necessary to design the new transit system or to change the old system so that it will attract new riders. An increase in ridership is necessary in order to help cover the costs of improving transit service. Improvements in transit service will depend on the goals and objectives that have been established for transit in the area. It will be necessary to know what areas are to be served, the people to be served, and the frequency of service to be provided to each area.

Once these decisions have been made, it will be necessary to determine the "latent demand" for transit service in the area including both potential captive and choice riders. In many cases, there are persons within the city who would be captive riders if transit were presently available to them and if it served the areas where they wished to go. These persons must be located as well as those persons that might become choice riders if the level and quality of transit service were improved.

In order to design the new system or make changes in the old one, it is necessary to obtain data on persons that

do not presently use transit. Data on characteristics of the area will also be needed in order to plan needed changes or to design a new system. The types of data, the sources for the data, and their presentation are discussed in the following sections.

Types and Sources of Data

The method used to obtain the data will depend on the type and amount of data to be collected. In general, it will be helpful to collect data similar to that collected on present transit riders. Useful information would include such things as the number of cars per household, the income per household, the number of persons in each household, the age distribution of each household, etc. The exact data collected will depend on what data are available from other sources.

Data sources would include transportation studies and any other studies or surveys that have been conducted in the area. Another sources of information is the state bureau of motor vehicles. In some states, a list can be obtained of the vehicle registrations for the area. These registrations can be coded to the study zones for analysis. A very important sources of information will be census data. The availability of the data as well as its form will depend on the size of the area and whether the area has been tracted.

For those cities over 50,000 that have been tracted, it will be possible to obtain all the census data. Part of the data will be in printed form and the rest on summary tapes. Also, available to these cities will be a standard package of programs (Urban Transportation Package) developed by the Bureau of the Census and funded by the Federal Highway Administration (FHWA) to produce a summary tape of a defined set of data for each traffic zone. The cost of this tape will be for processing only.¹

The delivery process on these tabulations is as follows: (a) a local agency, if it chooses to participate in the program, makes its request; (b) the request must be accompanied by a conversion file of census block numbers to traffic zones; and (c) the Bureau of the Census produces the summary tape and delivers it to the requester. This program is expected to begin in late 1971 or early 72.

The areas of summarization need not be traffic zones. The programs can develop summaries at any area level defined by block, consistent with disclosure and reliability constraints.

STANDARD PACKAGE CONTENTS

The package contains a trip table and tabulations at the zone of residence, zone of employment, and area-wide level. The trip tables give work trips from all zones to all zones. Tabulations at the zone of residence include summaries of person characteristics, head of household characteristics, household characteristics, and housing characteristics. Tabulations at the zone of employment include summaries of workers by occupation and by industry. Tabulations at the area-wide level include cross-tabulations of household characteristics, housing characteristics, and mode of transportation to work. Detailed formats of these tabulations have been circulated among the state transportation planning agencies and are available from the Federal Highway Administration.

These data will provide a means of doing extensive transit planning at a very minimal cost.

The only other data that might be needed are information on trips other than the work trip. There are a number of economical ways to obtain this information such as a license plate survey, a post card survey of a sample of the elderly or special groups or a post card type survey at major activity centers. These surveys are discussed in the next section dealing with cities under 50,000 that have not been tracted.

For those cities under 50,000 that have not been tracted, it will be possible to obtain a limited amount of census data by enumeration district. The data available by enumeration district (E.D.) consists of the information obtained at the 100 per cent survey level which is on the first count summary tapes from the 1970 census of population and housing. A list of the items collected in the 1970 census and the sample size used for each are shown in Table 3. All the information on these tapes are available in microfilm which is useful in small areas because it does not require a programmer or computer to be read. However, the information is in coded form on the microfilm (see Appendix D). Therefore, it will take some time to locate the desired information for each enumeration district. However, the cost of this information is very small, only \$8 per roll of 16mm microfilm. The number of rolls required for File A in

TABLE 3
1970 Census Subject Items Compared With 1960 Content²

The sample percentages for population and housing items included in the 1970 census in comparison with the items in the 1960 census are shown below. Each item is discussed on the page indicated.

<u>Population Items</u>	<u>1960</u>	<u>1970</u>	<u>Page</u>
Relationship to head of household.....	100	100	7
Color or race.....	100	100	7
Age (month and year of birth).....	100	100	7
Sex.....	100	100	7
Marital status.....	100	100	3
State or country of birth.....	25	20	8
Years of school completed.....	25	20	8
Number of children ever born.....	25	20	8
Employment status.....	25	20	9
Hours worked last week.....	25	20	9
Weeks worked last year.....	25	20	9
Last year in which worked.....	25	20	9
Occupation, industry, and class of worker.....	25	20	9
Activity 5 years ago.....	-	20	3
Income last year:			
Wage and salary income.....	25	20	10
Self-employment income.....	25	¹ 20	5
Other income.....	25	² 20	6
Country of birth of parents.....	25	15	10
Mother tongue.....	25	15	10
Year moved into this house.....	25	15	11
Place of residence 5 years ago.....	25	³ 15	6
School or college enrollment (public or private)....	25	15	11
Veteran status.....	25	15	11
Place of work.....	25	⁴ 15	6
Means of transportation to work.....	25	15	11
Mexican or Spanish origin or descent.....	-	5	4
Citizenship.....	-	5	4
Year of immigration.....	-	5	4
When married.....	25	⁵ 5	7
Vocational training completed.....	-	5	4
Presence and duration of disability.....	-	5	5
Occupation-industry 5 years ago.....	-	5	4

¹ Single item in 1960; two-way separation in 1970 by farm and nonfarm income.

² Single item in 1960; three-way separation in 1970 by social security, public welfare, and all other receipts.

³ This item is also in the 5-percent sample but limited to State of residence 5 years ago.

⁴ Street address included in 1970.

⁵ In 1960, whether married more than once and date of first marriage; in 1970, also includes whether first marriage ended by death of spouse.

TABLE 3
1970 Census Subject Items Compared With 1960 Content--Continued²

<u>Housing Items</u>	<u>1960</u>	<u>1970</u>	<u>Page</u>
Number of units at this address.....	-	⁶ 100	5
Telephone.....	25	⁷ 100	11
Access to unit.....	100	100	11
Kitchen or cooking facilities.....	100	-	15
Complete kitchen facilities.....	-	100	5
Condition of housing unit.....	100	-	15
Rooms.....	100	100	11
Water supply.....	100	100	12
Flush toilet.....	100	100	12
Bathtub or shower.....	100	100	12
Basement.....	25	100	12
Tenure.....	100	100	12
Commercial establishment on property.....	100	100	12
Value.....	100	100	12
Contract rent.....	100	100	12
Vacancy status.....	100	100	13
Months vacant.....	25	100	13
Components of gross rent.....	25	20	13
Heating equipment.....	25	20	13
Year structure built.....	25	20	13
Number of units in structure and whether a trailer..	20	20	14
Farm residence (acreage and sales of farm products).	25	20	14
Land used for farming.....	25	-	16
Source of water.....	20	15	14
Sewage disposal.....	20	15	14
Bathrooms.....	20	15	14
Air conditioning.....	5	15	14
Automobiles.....	20	15	14
Stories, elevator in structure.....	20	5	15
Fuel--heating, cooking, water heating.....	5	5	15
Bedrooms.....	5	5	15
Clothes washing machine.....	5	5	5
Clothes dryer.....	5	5	5
Dishwasher.....	-	5	5
Home food freezer.....	5	5	5
Television.....	5	5	7
Radio.....	5	5	15
Second home.....	-	5	5

⁶ To be collected primarily for coverage check purposes.

⁷ Required on 100-percent for field followup purposes.

each state is shown in Appendix D. A complete copy of the census report from which this information was taken is provided in Appendix D. The report title is "1970 Census Summary Tape User Memorandum No. 30 (Revised)."

The exact type of information available on the first count summary tapes is provided in Appendix D in a census report titled "First Count Summary Tapes from the 1970 Census of Population and Housing." There are a number of data items that will prove quite useful. The information on population distribution by specific age groups for each E.D. will be helpful in locating those areas having a high number of young and elderly. These areas are where higher transit ridership may be expected. Along this same line the data items, value of owner-occupied housing units and monthly contract rent for renter-occupied units will be useful in determining an approximate income level for each E.D. Those areas with a high income level can generally be expected to generate a low transit ridership. A lot more information is available and can be used at the discretion of the study group.

Those census data items that were not collected at the 100 per cent level cannot be obtained for enumeration districts unless a special tabulation is made. These special tabulations are quite expensive depending on the amount of information requested and the size of the area. A number of organizations throughout the United States have purchased

the census tapes and are making special tabulations. A list of these organizations is contained in Appendix D in a census report titled "Summary Tape Processing Centers." If the study group wishes to have special tabulations made it should contact one of these centers or the United States Bureau of the Census in Washington D.C.

In the cities under 50,000 that have not been tracted, the data from the census will probably not be enough to do all the transit planning. It may be necessary to obtain additional data particularly on non-transit user travel patterns. There are a number of relatively inexpensive methods for obtaining this data. In order to get work trip data it should be possible to conduct an employee survey. There are a couple of ways to do this. In some cases it will be possible to go to the employers of the area and obtain the names and addresses of their employees as well as their usual work schedule. This information can then be coded to the analysis zones.

If it is felt that the first method violates the employees rights or if more information is desired from each employee, then a survey card can be used to collect the desired information. This survey card is usually small and contains only a few questions. The usual information is home address, work schedule, and then a few questions which the study group may wish to ask concerning such things as mode to work, reaction to transit system, etc. The survey card

should be designed in the same manner as the on-board O-D survey questionnaire discussed in Chapter III.

Besides work trip information it might be desired to collect information on other trips such as shopping, recreation, etc. These can be obtained through a license plate survey at major activity centers. In conducting the survey a "typical day" should be used as in the on-board O-D survey. The license plate survey can be conducted over a period of days or weeks. It is not necessary to obtain a 100 per cent sample, but it will probably be as easy to get a 100 per cent sample as it would to get a random sample. Once the license plate numbers are recorded they are then matched to the addresses which can be obtained from the state bureau of motor vehicles. This information is then coded to the analysis zones.

If more information is desired from persons making trips such as shopping, recreation, etc. or from special groups such as the elderly, a post card survey can be done. Generally, these post cards are handed out at the major activity centers with the respondent mailing in the completed card. The cards are coded with a number which will be used to record the building or area where the cards were passed out. A sample survey card that was used in Detroit is shown in Figure 8. The return rate on this type of survey is generally very low, usually ranging from 10-30 per cent.

CITY OF DETROIT — CENTRAL BUSINESS DISTRICT STUDY

Your help is needed to plan an improved downtown Detroit. Please fill out this card about your trips today. Drop in any U.S. mail box.

NOTE: If you received more than one card today, fill out and mail only one.

1. WHAT WAS YOUR DESTINATION IN THIS BUILDING?

(Room No., Name of Company or Name of Doctor, Lawyer, etc.)

2. WHAT WAS THE PURPOSE OF YOUR TRIP TO THIS BUILDING?

- ☐ Place of work ☐ Business call ☐ Shopping ☐ Eat - Coffee Break
☐ Social - Recreation ☐ Personal business (Visit doctor, lawyer, bank, gov't. office, etc.) ☐ Passing thru ☐ Other _____

3. IF YOU WORK HERE, HOW OFTEN DID YOU LEAVE BLDG? _____ TIME(S)

4. WAS TRIP TO THIS BUILDING MAIN REASON FOR COMING DOWNTOWN?

☐ YES ☐ NO

IF NO (a) WHAT WAS THE MAIN REASON FOR COMING DOWNTOWN?

- ☐ Place of Work ☐ Business call ☐ Shopping ☐ Eat meal
☐ Social - Recreation ☐ School ☐ Personal business (Visit doctor, lawyer, gov't. office, etc.) ☐ Other _____

(b) LOCATION OF MAIN REASON FOR COMING DOWNTOWN

(Nearest Street Corner or Building Name)

5. HOW DID YOU ENTER DOWNTOWN AREA TODAY? (CHECK ONE)

☐ Auto Driver ☐ Auto Passenger ☐ Bus ☐ Train ☐ Taxi ☐ Walk ☐ Other

6. HOW DID YOU GET FROM DOWNTOWN END OF TRANSPORTATION CHECKED IN QUESTION NO. 5 TO THE FIRST PLACE YOU WERE GOING?

☐ Walk ☐ Bus ☐ Taxi ☐ Auto Passenger ☐ Other

7. IF YOU DROVE DOWNTOWN --

(a) WHERE DID YOU PARK? ☐ In Lot ☐ In Garage ☐ At Curb

(b) HOW MANY BLOCKS WAS PARKING PLACE FROM WHERE YOU WERE GOING? ☐ Less than 1 ☐ 1-2 ☐ 2-3 ☐ 3-4 ☐ Over 4

(c) HOW MANY HOURS DID YOU PARK? ☐ Less than 1
☐ 1-2 ☐ 2-3 ☐ 3-4 ☐ 4-5 ☐ Over 5

8. CHECK ONE OR MORE PRINCIPAL REASONS FOR CHOICE OF TRANSPORTATION USED FOR TRIP INTO DOWNTOWN AREA

AUTO DRIVERS

- ☐ No bus available
☐ Bus service too slow
☐ Bus service requires transfer
☐ Prefer comfort and convenience of auto
☐ Need auto for other purposes

BUS OR TRAIN RIDERS

- ☐ Do not like to drive
☐ Bus or train more convenient than auto
☐ No driver's license
☐ Family does not own auto
☐ Auto used by others
☐ Bus or train less expensive than auto
☐ Parking not available at reasonable rates

AUTO PASS. & OTHERS

- ☐ No bus available
☐ Bus service too slow
☐ Bus service requires transfer
☐ Ride available
☐ Guest in hotel
☐ Live within walking distance
☐ Ride with person who did not park downtown

9. WHAT IS YOUR HOME ZIP CODE? _____

10. WHAT IS YOUR AGE? ☐ Under '6 ☐ 16-20 ☐ 20-30 ☐ 30-40

N^o 37493

☐ 40-50 ☐ 50-65 ☐ Over 65

C of D-67-PO-A

FIGURE 8

SAMPLE SURVEY CARD³

A final but more costly method of obtaining travel data from non-bus users is through the use of a mail-in or home interview questionnaire. A sample copy of the cover letter, trip log, and one of the two questionnaires used in the home interviews in the Greater Lafayette Area Transportation and Development Study conducted by the Tippecanoe County Area Plan Commission are provided in Appendix E. The questionnaire is self-explanatory and could have been used in a mail-in survey. However, the home interview was used to insure a higher return rate and to help reduce the amount of bias in the sample. The sample size can vary widely, but the following rates are recommended.⁴

For determining general transportation plans, the sample rates should not be smaller than given below. However, if more precise plans are called for, the sample rates recommended by the Bureau of Public Roads should be followed.

Metropolitan Population	Minimum Sample Rate	Sample Rate Recommended by the Bur- eau of Public Roads
Under 50,000	10%	20%
50,000 - 150,000	5%	12-1/2%
150,000 - 300,000	3%	10%
300,000 - 500,000	2%	6-2/3%
500,000 - 1 million	1.5%	5%
Over 1 million	1%	4%

Additional data besides those on non-bus users are needed for transit planning. These include information on the area in the form of land-use data as well as economic and population growth trends. These items will be discussed in the following sections.

Land-Use Data

This information is necessary to determine the location of activity centers in relation to residential areas which should aid in routing and scheduling. Also, by continued updating of the land-use map, changes in location trends can be found. This will aid in planning new routes and making changes in old ones.

There are a number of ways to obtain land-use data. In the larger cities land-use maps may already have been developed by the planning department. However, if a land-use map is not available, it will be necessary to develop one. For transit planning purposes this map can be less detailed than typical land-use maps. The main thing is to locate specific land-use groups and in the case of large businesses or industries, the exact use and owner can be specified. A typical land-use grouping will contain 8-10 land-use classifications. Two examples are provided below.

Land-Use Classification System. Northeastern Illinois Metropolitan Area Planning Commission.⁵

1. Residential
2. Business and Commercial
3. Industrial
4. Transportation Services
5. Public, Cultural, Educational and Related
6. Parks and Recreation
7. Utilities
8. Agricultural
9. Miscellaneous Uses

Land-Use Classification Manual. Developed by the Land Classification Advisory Committee of the Detroit Metropolitan Area.⁶

0. Residential
1. Extractive and Industrial Nonmanufacturing
2. Manufacturing {light}
3. Manufacturing {heavy}
4. Transportation, Communications, and Utilities
5. Commercial
6. Personal, Business, and Professional Services
7. Public and Quasi-Public Services
8. Recreation
9. Unused Space

Both of the examples listed above are further broken down for each classification, however, for transit planning purposes the broad groups will be adequate. It might be beneficial to have a number of residential classifications which distinguish dwelling types.

A number of methods may be used to obtain land-use information. Where available, airphotos can be used to locate general land-uses. Those areas which are unclear can be checked by visual inspection. Another possible source is the use of Sanborn maps. These maps may be available through local insurance companies. In using these maps the study group should check to see if the information is up-to-date. In some cases these maps are updated only every five to ten years. However, between the use of airphotos, Sanborn maps, and visual inspection, it should be possible to develop a fairly accurate land-use map with a minimum of effort.

Once the information is obtained it should be color coded or coded to a set of black and white patterns which can then be used to code a map of the area. This map will be very helpful in planning new transit routes or making changes in old routes.

Notes

¹Sydney R. Robertson, Federal Highway Administration, 400 7th Street S.W., Washington, D.C. 20591, "Journey-to-Work Statistics," Highway Research Board, Special Report 121, Use of Census Data in Urban Transportation Planning (Highway Research Board, 2101 Constitution Avenue, Washington, D.C. 20418, 1971), p. 41.

²U.S. Department of Commerce, Bureau of the Census, Data Access Description No. 14, Items Contained in the 1970 Census of Population and Housing (Washington, D.C. 20233, March, 1970), p. 2.

³Central Business District Study, City of Detroit, Central Business District Study Survey Card (Detroit, Michigan, 1968).

⁴NCUT, National Committee on Urban Transportation, Procedural Manual 2A, Origin-Destination and Land Use (Public Administration Service, 1313 East Sixtieth Street, Chicago 37, Illinois, 1958), p. 15.

⁵Northeastern Illinois Metropolitan Area Planning Commission, Land Use Handbook (400 W. Madison Avenue, Chicago, Illinois 60606, 1961), p. 34.

⁶Land Classification Advisory Committee of the Detroit Metropolitan Area, Land Use Classification Manual (Public Administration Service, 1313 East Sixtieth Street, Chicago 37, Illinois, 1962), p. 3.

CHAPTER V. FORECASTING AND DATA PRESENTATION

In the conventional transportation studies that have been conducted, a lot of time and effort has gone into the forecasting phase. This phase consists of such things as trip generation, trip distribution, and modal split and trip assignment. Also, included in this phase were other projections such as population and economic forecasts as well as future land-use trends.

In transit planning and particularly in small areas a lot of effort cannot be spent on the forecasting phase. However, this phase cannot be ignored. Most of the studies in the past have made their forecasts for periods of 10 to 20 years in the future. A long planning period may be alright if no major changes are to be made in the transportation system during that time. However, if major changes are to be made in the system, it becomes difficult to predict the effects on the system due to these major changes. Thus, for the transit planning being done in small areas a much shorter forecasting period must be used. There are several reasons for this. Generally, transit ridership will consist of captive riders at the time planning is being done. Also, old equipment will probably be in use over routes that haven't changed in years. Once the planning

recommendations are implemented, one might expect drastic changes to be made in the type of equipment used as well as the routes used and the level of service being provided. It will therefore be impossible to forecast accurately the ridership trends on this new system 10 to 20 years hence based on the data collected on the old system.

It is suggested that a 3 to 5 year forecasting period be used for designing the new or improved transit system. In making the forecasts for this period it is suggested that the mathematical models developed in other studies not be used. There are several reasons for this.

1. Generally, a large amount of data is needed to calibrate and use most of the models that have been developed. Not only is it expensive to collect these data but a high level of technical know how is needed to properly use these models.

2. Generally, these models are less accurate for small areas having a small number of daily trips. Also, these models are usually designed and calibrated to forecast for a 10 to 20 year period. Therefore, the models would have to be recalibrated to the 3 to 5 year period as well as to reflect any differences between the area where the model was developed and any other area where it was to be used.

Before the study group attempts to do any forecasting, it should look for other sources of forecast data. If a transportation study has been done in the area, it may be

possible to evaluate and use the forecasts previously prepared. These forecasts would include population and land-use forecasts as well as trip generation, etc.

Another source of information might be colleges and universities in the state that may have done population and economic forecasts for certain regions of the state. Along this same line it might be helpful to check with business organizations in the area such as the chamber of commerce for any economic forecasts that are available for the area.

From the above sources it should be possible to obtain the population, economic, and land-use trends to be expected in the 3 to 5 year planning period. However, it may not be possible to obtain a forecast for transit ridership for that same period. There are a couple of ways that the study group may obtain a forecast for transit ridership.

In most cases the present transit system will have experienced a fluctuating up and down trend in ridership over the last ten years with a continued decline over the past several years. This pattern can be determined by plotting the yearly system passenger revenue for a ten year period. This plot might look like that of the Lafayette system as shown in Figure 9. If so, a good estimate for ridership expected from a new or improved system in the 3 to 5 year planning period would be the ridership at the highest peak in the last ten years. In the case of the Lafayette system, this would be in 1960.

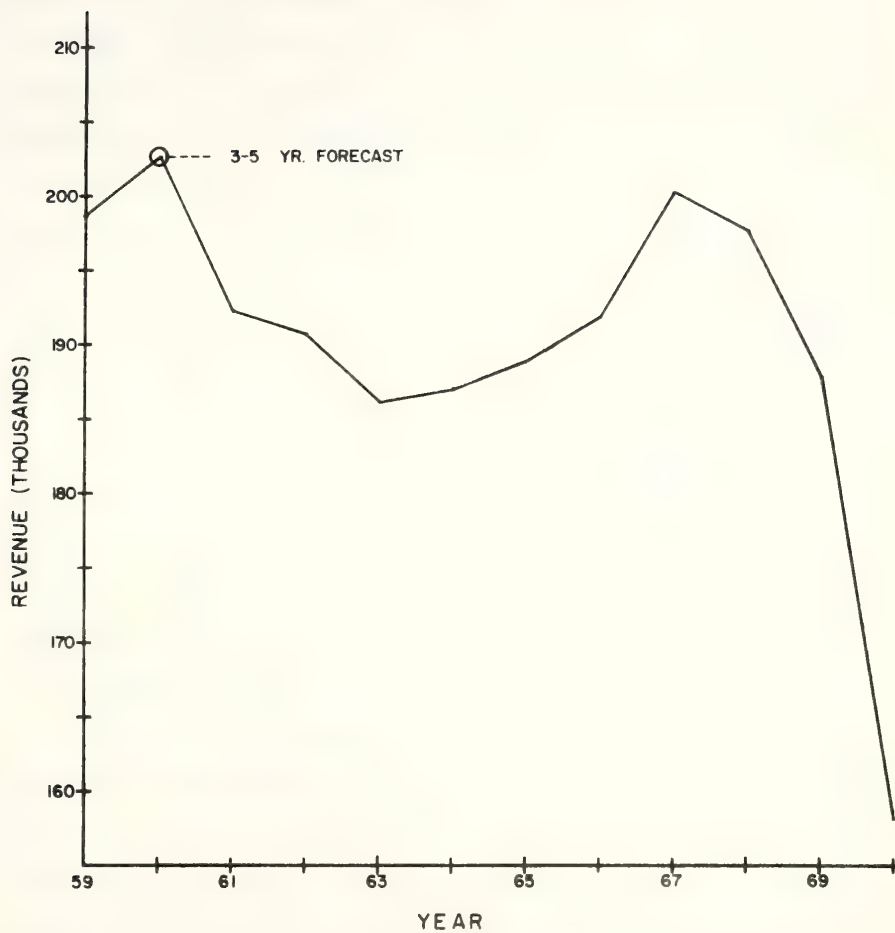


FIGURE 9
PASSENGER REVENUE - GREATER LAFAYETTE BUS CO.

Generally, this point will occur at a time in the past when the present system was then providing a higher level of service, possibly had expanded coverage, and better equipment over what presently exists. This ridership estimate is based on an increased level of service. In some cases the increase in ridership may come quickly with the implementation of major system improvements. However, it most likely will take 2 to 3 years for people to change their riding habits, particularly those that have purchased a second car as an alternative to using the old transit system. The new system will have to prove itself before these people will be willing to give up that second car.

If the plot of passenger revenue does not decline for the last year or two but is increasing then it may be possible to apply a growth factor to develop a ridership forecast. Generally, ridership can be expected to equal past ridership peaks and in a few cases exceed them in the 3 to 5 year forecast period.

It should be remembered that this increased ridership will come from persons presently having an alternative means of transportation. They may be persons that were once transit users and stopped using transit because of the poor level of service or those that do not wish to spend the money for a second car. In either case they will be attracted to transit only if they are convinced that the improved level of service will be maintained.

Since a short forecasting period is being used it will be necessary to continue monitoring the system after implementation to insure that the system does not become overloaded. Since the transit system is flexible, it will be possible to prevent overloading by adding additional vehicles as they are needed. This continuing planning process will be discussed in a later chapter.

Data Presentation

After the planning data have been collected it should be presented in a way that aids in the analysis process. Some of the data will lend itself to being tabulated in tables or charts; other data can be plotted on graphs or maps. The purpose of this section is to encourage the study group to be innovative and to present the data in any form which might be useful in the analysis phase.

Placing data on maps of the area, particularly one showing the analysis zones, can be very effective for analysis purposes. The use of color schemes should be encouraged not only because it improves the appearance of the report but also because it enables the study group to put two or three types of information on one map.

A few examples of data presentation will be provided here in order to show some of the ways that data may be presented for analysis purposes. The origin and destination data collected in the on-board O-D survey can be tabulated and presented in a trip table as shown in Table 4. The O-D

TABLE 4
TRIP TABLE FROM GREATER LAFAYETTE AREA BUS STUDY²

information collected on non-bus users can also be presented in this manner. Other information gathered from the various surveys can be presented in tabular or chart form as in Tables 5-10 and Figure 10.

Once the data have been tabulated and recorded, it is then possible to plot some of it on maps of the area. Figure 11 shows the presentation of transit routes and the area coverage of each route. From this map it is easy to find those areas outside of the one-quarter mile service area. If colors are used, it is possible to show other data on this map such as average family income for each analysis zone. This can also be done through the use of transparent overlays each having a specific type of data recorded on them by analysis zone. A plot can also be made as in Figure 12 showing the zones that are major generators of trips. Other types of data such as number of employees in each zone, number of persons in certain age groups by zone etc., can be presented in the same manner. It has often been said that a picture is worth a thousand words and this statement was never truer than in the analysis phase of the planning process. Putting forth a lot of time and effort on data presentation will prove worthwhile when it is time for system design and analysis.

Notes

¹CE 664, Urban Transportation Planning, Term Project, Purdue University, Greater Lafayette Area Bus Study, Professor Kenneth W. Heathington (Civil Engineering Building, Lafayette, Indiana 47907, January 1971), p. 32.

TABLE 5
TRIP PURPOSE - INTERNAL SURVEY
 Auto Drivers
 Champaign-Urbana Urban Area Transportation Study ³

PURPOSE FROM	PURPOSE TO										TOTAL	PER- CENT
	0	1	2	3	4	5	6	7	8	9		
0 Home	--	16,928	12,265	2,358	6,271	13,911	79	1,188	13,139	14,168	80,307	36.6
1 Work	15,650	4,035	3,170	539	180	973	67	4,707	2,211	1,816	33,348	15.2
2 Personal Business	11,492	948	3,126	185	179	915	--	236	1,580	520	19,181	8.7
3 Medical-Dental	2,076	189	221	211	27	228	--	41	370	93	3,456	1.6
4 School	5,546	231	461	115	279	475	--	527	389	450	8,473	3.9
5 Social-Recreation	15,339	125	441	159	123	2,026	--	202	752	620	19,787	9.0
6 Change Mode	120	45	28	--	--	--	--	--	28	--	221	0.1
7 Eat	1,128	3,473	519	90	518	458	--	--	444	487	7,117	3.2
8 Shop	16,273	515	1,671	174	220	1,621	17	3,641	718	25,307	25,307	11.5
9 Serve Passenger	11,777	2,305	1,489	488	918	1,380	18	467	1,509	2,121	22,472	10.2
TOTAL	79,401	28,794	23,391	4,319	8,715	21,987	191	7,825	24,063	20,993	219,669	
PERCENT	36.1	13.1	10.7	2.0	4.0	10.0	0.1	3.6	10.9	9.5		100.0

TABLE 6
TRIP PURPOSE - INTERNAL SURVEY
 Transit Passenger
 Champaign-Urbana Urban Area Transportation Study ³

PURPOSE FROM	PURPOSE TO										TOTAL	PER- CENT
	0	1	2	3	4	5	6	7	8	9		
0 Home	--	268	33	61	1,187	50	8	--	68	--	1,675	40.0
1 Work	161	--	10	--	--	--	10	10	9	10	210	5.1
2 Personal Business	44	--	8	--	--	--	--	--	24	--	76	1.8
3 Medical-Dental	53	--	--	--	--	--	--	--	--	--	53	1.3
4 School	1,106	8	--	--	53	10	27	286	9	--	1,499	35.8
5 Social-Recreation	60	--	8	--	--	8	--	16	--	--	92	2.3
6 Change Mode	26	32	16	--	16	8	8	--	8	--	114	2.8
7 Eat	10	10	--	--	244	8	--	--	--	--	272	6.5
8 Shop	128	--	18	--	--	--	--	--	17	--	163	3.9
9 Serve Passenger	--	21	--	--	--	--	--	--	--	--	21	0.5
TOTAL	1,588	339	93	61	1,500	84	53	312	135	10	4,175	
PERCENT	38.0	8.1	2.3	1.5	35.8	2.0	1.3	7.5	3.3	0.2		100.0

TABLE 7

TAMPA TRANSIT TRIP PURPOSE BY INCOME⁴

Income of Residential Zone	Work		Shopping		Personal Business		Social Recreational		School		Other		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
\$2,000 - \$3,000	977	11	-	-	136	7	-	-	45	1	6	1	1164	6
\$3,001 - \$4,000	3667	42	708	40	609	30	330	28	1305	26	74	13	6693	35
\$4,001 - \$5,000	1987	22	504	29	555	28	381	33	1214	24	286	49	4927	25
\$5,001 - \$6,000	809	9	212	12	220	11	276	23	992	20	32	6	2541	13
\$6,001 - \$7,000	871	10	228	13	182	9	169	14	423	8	67	12	1940	10
\$7,001 - \$8,000	116	1	24	1	76	4	-	-	252	5	56	10	524	3
\$8,001 - \$10,000	158	2	85	5	170	8	26	2	348	7	8	1	795	4
\$10,001 - \$15,000	259	3	-	-	50	3	-	-	458	9	48	8	815	4
Total	8844	100	1761	100	1998	100	1182	100	5037	100	577	100	19399	100
Percent	46		4		10		6		26		3		100	

TABLE 8
ORIGIN AND DESTINATION OF INDUSTRIAL EMPLOYEES IN THE SCHENECTADY AREA *

Industry: Location:	Consolidated Diesel Electric		Sealtest Foods		Schenectady Chemicals, Inc. Rotterdam		MMM Corp.		Alco Products		General Electric Corp.	
Destination Zone:	Schenectady	Scotia	Schenectady	Scotia	Schenectady	Niskayuna	Schenectady	Niskayuna	Schenectady	Niskayuna	Schenectady	Niskayuna
	8C	4	2B	3B	8C	14	3B	2A	3A	8C		
	Number of Employees											
Origin Zone:												
01	3	6	3	3	2	-	4	11	244	61		
2A	10	6	12	5	2	2	5	60	750	188		
2B	4	6	6	1	3	-	6	26	575	144		
3A	4	5	2	8	2	3	11	7	413	103		
3B	11	14	7	21	6	8	21	26	1,068	267		
3C	17	14	6	9	2	7	22	27	1,202	300		
04	6	14	11	2	1	3	8	49	952	238		
05	3	1	3	7	4	1	3	29	1,080	270		
6A	7	2	13	6	3	1	6	40	906	225		
6B	3	2	3	4	-	2	8	9	285	71		
07	8	9	7	4	6	6	7	54	820	205		
8A	-	-	2	1	2	-	-	11	377	94		
8B	-	1	1	3	2	1	-	4	296	74		
8C	12	5	5	4	2	1	11	60	1,307	327		
9A	5	1	4	5	1	1	12	26	765	190		
9B	14	6	7	8	1	6	18	42	213	53		
9C	1	3	4	4	2	1	1	18	166	42		
10	10	2	8	7	5	6	19	47	517	129		
11	3	4	7	2	2	-	2	33	778	195		
12	-	3	-	2	1	1	1	-	286	71		
13	4	2	1	-	-	4	1	8	286	72		
14	1	3	2	1	2	15	-	8	214	53		
15	10	19	14	7	1	4	7	33	900	225		
16	8	3	11	1	7	1	1	40	1,000	250		
17	30	22	2	6	7	4	4	81	1,440	360		
18	45	50	7	7	2	17	1	39	2,660	665		
Distant Communities	14	2	-	-	-	-	-	6	500	127		
Approximate Number of Employees	233	205	148	128	65	98	179	794	20,000	5,000		

NOTE: Employee origin by zones determined from addresses furnished by employers, except for General Electric Corporation, which was expanded from information available.

TABLE 9

SURVEY OF RETIRED PERSONS LIVING IN SCHENECTADY AREA ⁷

Analysis of Questionnaire	Driver's License Available		Driver's License Not Available		Total	Percent
	Nos.	% of Total	Nos.	% of Total		
1. Driver's License	48	66.7	24	33.3	72	100.0
2. Average Monthly Trips/Person						
Shopping Trips	11.9		9.1		11.0	
Medical Trips	1.4		2.6		1.8	
Work Trips	6.0		5.2		5.7	
Social Trips	8.0		6.4		7.5	
Average Monthly Trips/Person	27.3		23.30		26.0	
3. Auto Availability						
Available	44	61.1	2	2.8	46	63.9
Not Available	4	5.6	22	30.5	26	36.1
4. Use of Local Bus Service						
Use	27	37.5	24	33.3	51	70.8
Do not use	21	29.2	-	-	21	29.2
5. Use of Evening Bus Service						
Would use	16	22.2	18	25.0	34	47.2
Would not use	30	41.7	6	8.3	36	50.0

NOTE: Based on return of questionnaires mailed to 250 retired persons selected at random from the 1968 City of Schenectady Directory (Manning).

TABLE 10

AUTO DRIVERS' REASONS FOR SELECTING MODE OF TRAVEL
FOR WORK TRIP⁸

<u>Auto Drivers</u>	<u>Number of Responses of Auto Drivers</u>	<u>Percent of Total Responses from Auto Drivers</u>
No bus available	138	16.0
Bus service too slow	83	9.6
Bus service requires transfer	42	4.9
Prefer comfort and convenience of auto	320	37.1
Use auto at work	92	10.7
Auto less expensive	67	7.8
Auto would otherwise be idle	77	8.9
Member of car pool	10	1.2
Other	33	3.8
TOTAL	862	100.0

Note: Respondents could indicate more than one reason for their choice of mode of travel to work.

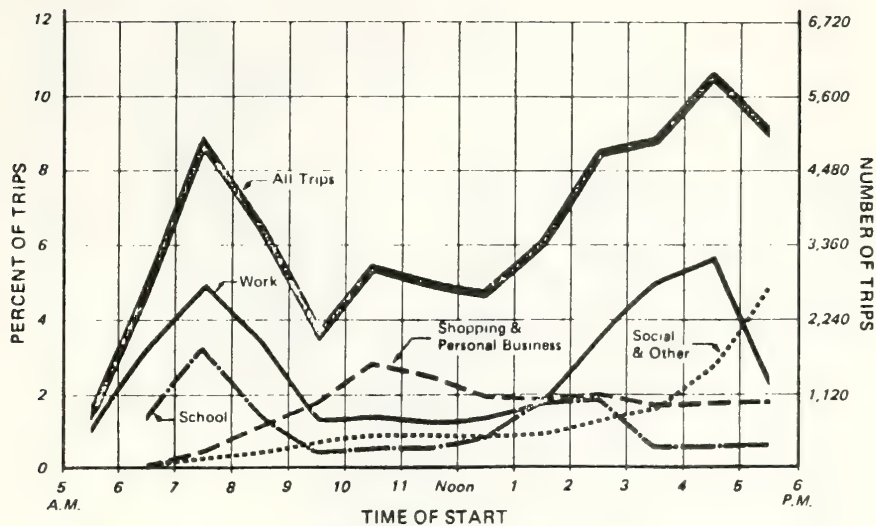
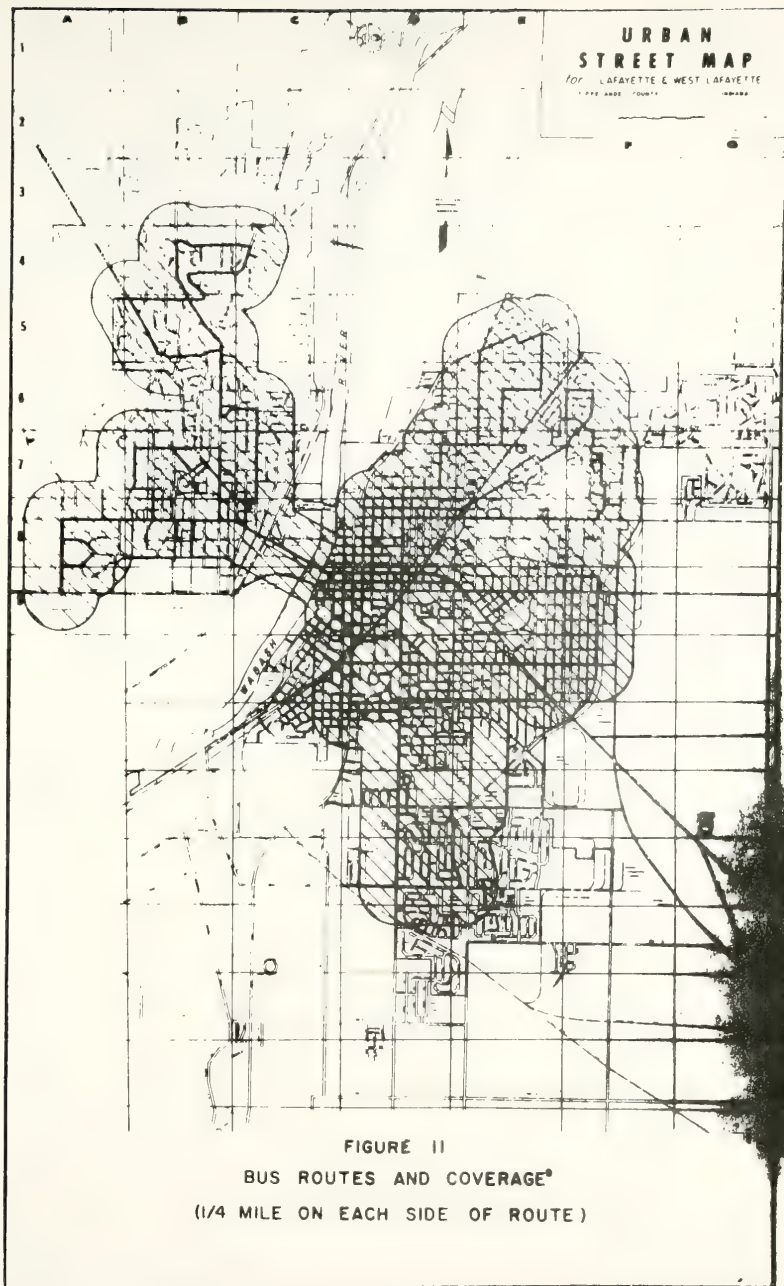
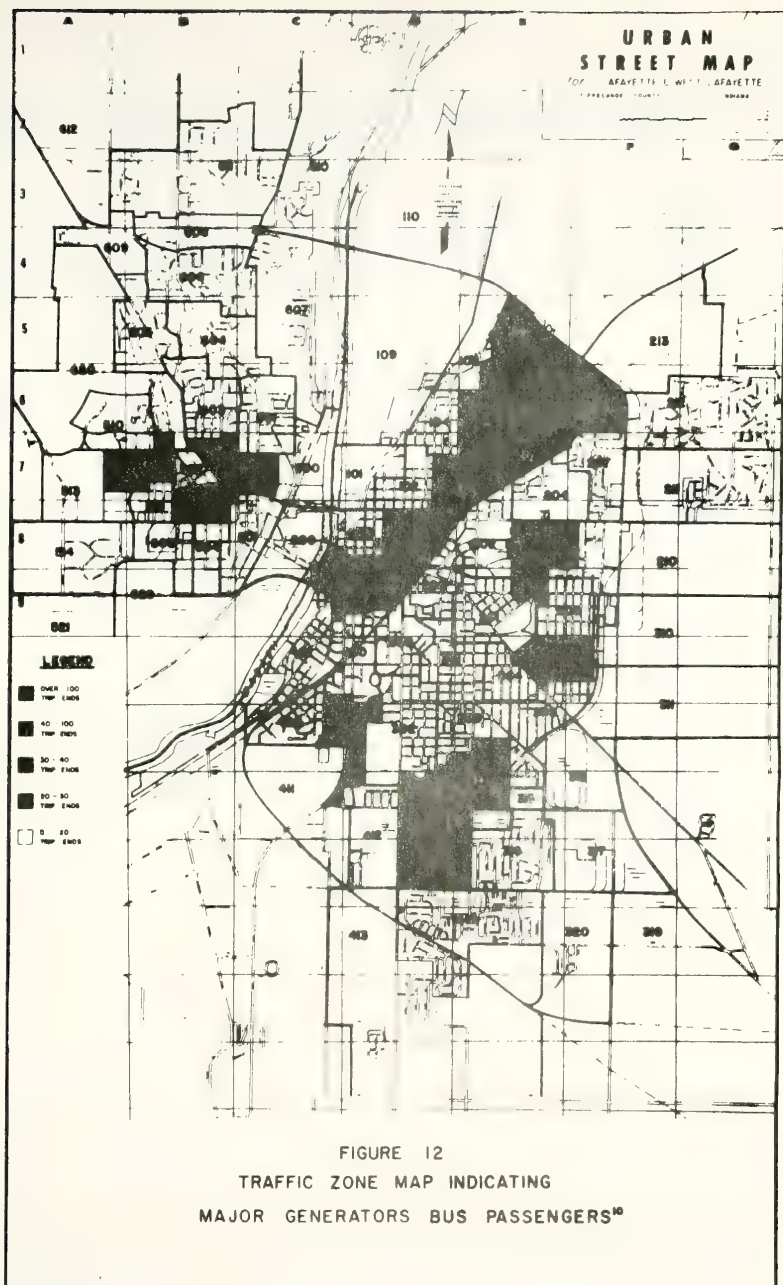


FIGURE 10
TRIP DISTRIBUTION BY TIME & PURPOSE (SDTC)⁵





²Ibid., p. 65.

³Harland Bartholomew and Associates, 188 Jefferson Avenue, Memphis, Tennessee, Comprehensive Transportation Plan for the Champaign-Urbana Urban Area (Prepared for the Champaign-Urbana Urban Area, Illinois, July, 1970), p. II-23.

⁴Alan M. Voorhees and Associates, Inc., Westgate Research Park, McLean, Virginia 22101, Technical Report Five, Transit Studies, Tampa Urban Area Transportation Study (Prepared for the Hillsborough County Planning Commission, 401 Courthouse Annex, Tampa, Florida 33602, February, 1968), p. 24.

⁵Comprehensive Planning Organization, Job Number 6103, Transit Survey (801 Co Administration Center, San Diego, California 92101, March, 1970), p. 18.

⁶Corrdry, Carpenter, Dietz, and Zack, and Gannett, Fleming, Corrdry, and Carpenter, Engineers, P.O. Box 1963, Harrisburg, Pennsylvania 17105, Mass Transit Feasibility Study Schenectady City and County (Prepared for the State of New York, Department of Transportation, Development Division, 1220 Washington Avenue, Albany, New York 12226, April 4, 1969), Exhibit R.

⁷Ibid., Exhibit T.

⁸Joint Highway Research Project, Purdue University, The Greater Lafayette Area Bus Transit Study, Project director Kenneth W. Heathington (Civil Engineering Building, Lafayette, Indiana 47907, April, 1971), p. 45.

⁹CE 664, Urban Transportation Planning, p. 17.

¹⁰Ibid., p. 18.

CHAPTER VI. SYSTEM DESIGN AND ANALYSIS

In order to develop a number of alternative system designs, the study group must determine what types of hardware are available, the possible organizational set ups, as well as establishing certain design assumptions such as drivers wages, levels of service, depreciation rates, etc. This chapter covers some of the more important areas in the design phase.

Hardware Alternatives

One of the most important items in system design will be choosing the size and type of vehicle to be used. It is a good idea for the study group to design a number of systems using several different size buses. It will be necessary for the study group to obtain information on each type of bus as to its initial cost, operating costs, use life, options available, specifications, etc., such as would be available from manufacturers. A list of manufacturers and their addresses is provided in Appendix F. Also, provided are examples of some of the various types of equipment presently available as well as a sample specification sheet.

In purchasing new buses it will be necessary to develop a set of specifications. It is a legal requirement if public funds are used to purchase the equipment. In this case

it will be necessary to obtain bids from the manufacturers. To encourage competitive bids, the specifications must be written so that more than one manufacturer can bid on them. The specifications must also be written to cover every item desired by the study group. To add or change the contract can be very costly and time consuming. A sample of the bid forms and specifications used in Lafayette is provided in Appendix G.

The design of a number of alternative systems and the use of various types of hardware will be discussed in a later section of this chapter.

Organization Alternatives

The number of administrative personnel that will be needed will depend upon the organizational form. Generally, the type and structure of the set up for managing the transit operations will be dependent on the size of the operations. Figures 13, 14, and 15 show possible organizational frameworks based on the number of buses operated by the transit system.¹ It will be up to the study group to develop alternative types of management which could then be presented to the decision makers, thus giving them a choice.

Each of the management alternatives has its own advantages and disadvantages as well as certain economic costs. Therefore, it is necessary to develop a number of combinations of these alternatives in order to evaluate the ability of each to meet the system objectives. The next section

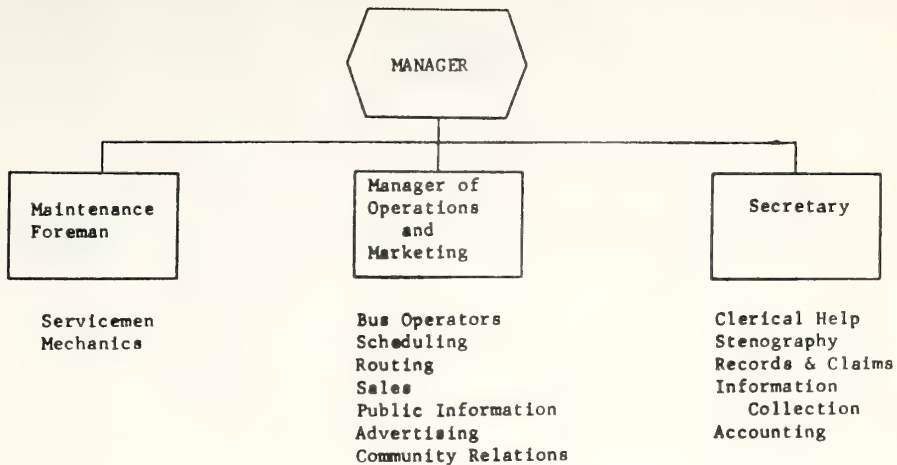


Figure 13: Organization Chart--Small Firms (10 or Less Buses)¹

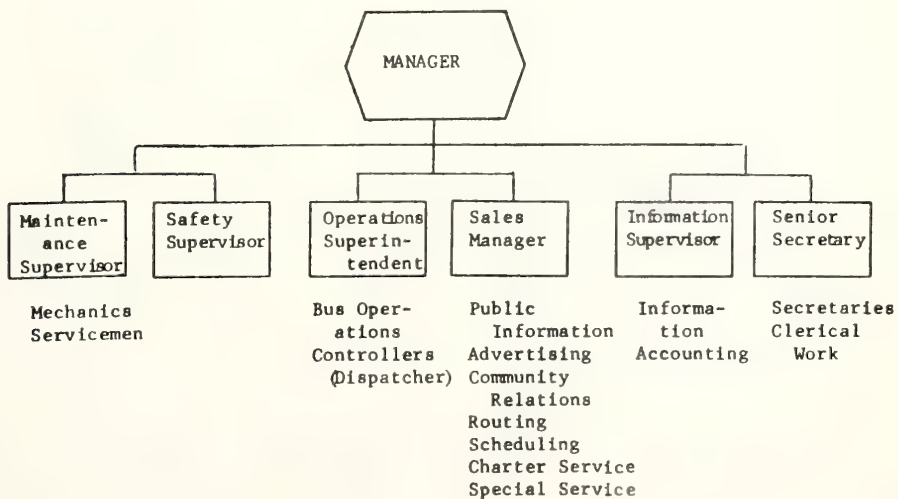


Figure 14: Organization Chart--Medium-Sized Firm (11 to 30 Buses)¹

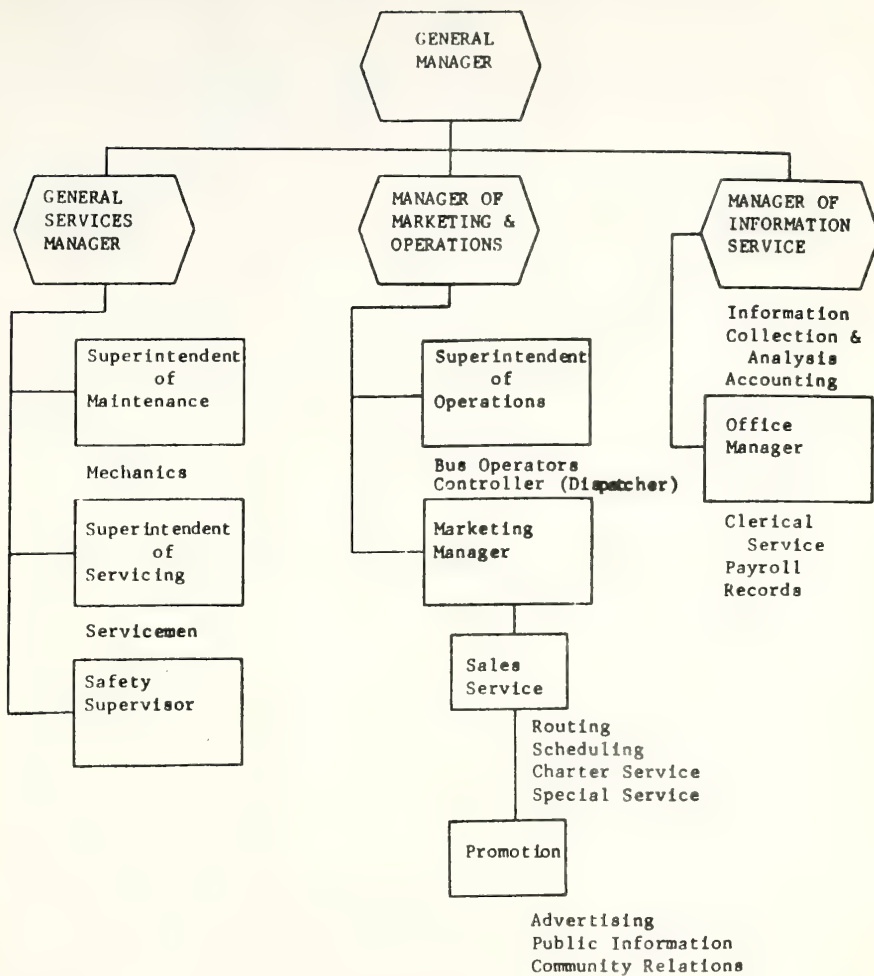


Figure 15: Organization Chart--Large Firms (31-100 Buses)²

will discuss the development of alternative systems.

Developing Alternative Transit Systems

Before developing the alternative systems, it would be wise to go over the objectives that have been established for transit in the area.

There is no established procedure for developing alternative systems. The quality of the systems designed will depend on the time and effort expended as well as the ingenuity and expertise of the personnel in the study group. Spending extra time on this phase of the planning process should be very beneficial.

In developing alternative systems, it will be necessary for the study group to establish assumptions to be used in designing each alternative with these assumptions varying for each urban area being studied. These assumptions will include such things as the level of service to be used for each alternative, the drivers wages to be used, the cost of equipment and facilities, etc. For example, some of the assumptions used in the Lafayette study are provided below. The values listed in the assumptions are probably low, as they do not reflect the inflationary trends since the Lafayette study was conducted.³

Assumptions

The basic assumptions concerning levels of service used in the evaluation of system alternatives are as follows:

1. Continuing the present level of service the same routes and schedules will be maintained.

2. Improving the level of service, a reduction of headways will be made by utilizing more equipment.
3. Improving the level of service, an extension of the area of coverage will be made by extending the present routes and/or establishment of new routes. Some routes may have a reduction in headways.

In all three levels of service, new equipment, new management and organization, and new terminal facilities will be used.

The basic assumptions used throughout the study for cost estimations are as follows:

1. Thirty-three passenger bus operational cost = \$.12 per mile.
2. Eighteen to twenty-three passenger bus operational cost = \$.07 per mile.
3. Twelve passenger bus operational cost = \$.07 per mile.
4. Basic hourly wage for drivers = \$3.00.
5. Managers annual salary = \$16,000.
6. Secretary-Bookkeeper's annual salary = \$5,400.
7. Two interns (1/2 time - each at \$6,000) = \$12,000.
8. Two maintenance employees (full time, each at \$6,000/year) = \$12,000.
9. Total salaries and wages including sick leave, vacation, unemployment, F.I.C.A., hospitalization, etc. = 1.15 times basic salary and wage rate.
10. Estimated cost of vehicles:
 - A. 45 passenger bus, air conditioned = \$36,000.
 - B. 33 passenger bus, air conditioned, other extras = \$26,500.
 - C. 18-23 passenger bus, air conditioned = \$13,152.
 - D. 12 passenger bus, air conditioned = \$8,000.

Capital recovery cost of vehicles for the various systems was based on a 10 year period at 8% interest for the 33 and 45 passenger buses, a 6 year period at 8% interest for the 18-23 passenger buses, and a 3 year period at 8% interest for the 12 passenger buses.

11. Office Expense:
 - A. Utilities, per year = \$2,200.
 - B. Supplies per year = \$4,000.
12. All systems are estimated with two way radio equipment at a cost per unit of \$500.
13. New fare boxes for all vehicles are included at an estimated cost of \$220 each.
14. The passenger figures used for all alternatives were obtained from the survey data.

Before the required number of buses and drivers can be determined, it will be necessary to determine the routes that will be used. It should be possible to develop a number of routing alternatives. These alternatives will include the existing routing scheme and possible extensions of those routes as well as the development of new routes. The development of routing schemes is a very difficult task. There are no set rules to follow in establishing routes, however a few guidelines are suggested as follows.⁴

Routing

Transit routes should be laid out to provide maximum service to the community as a whole. Transit should be conceived on a systemwide basis, but in the development of individual routes the following considerations are important:

1. The route should be direct with respect to origins and destinations of passengers. (Transfers which riders must make should be held to a minimum.)
2. Routes should be free of duplication except where they converge.
3. In built-up areas, routes should be spaced at approximately half-mile intervals (quarter-mile walking distance) with intervals increased proportionately in areas of medium and low population density.
4. Routes should include a minimum number of turning movements, and should have adequate provision for turn-around at both ends and for layover at one or both ends.

5. Routes should have reasonable long-term flexibility (not necessarily day-to-day flexibility), to meet changing conditions.
6. Routes should be laid out to take full advantage of street characteristics and possible operational improvements. Such factors include the condition and type of roadways utilized, design features, traffic control measures, strength of roadway structure (especially at vehicle stops), width, surface, control of access from side streets, and provisions for loading and unloading.

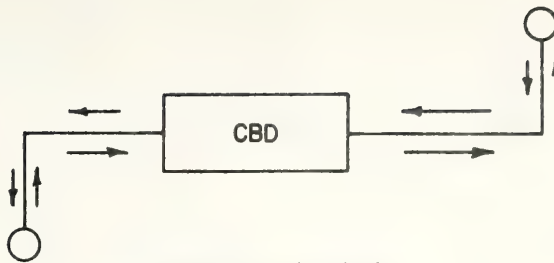
In adjusting present routes and developing new ones, the convenience and comfort of passengers should be a prime consideration. Improvement of transit speed is of the utmost importance. Speed often can be stepped up by selecting routes which have desirable physical characteristics and on which advantageous parking and traffic control measures can be adopted.

The routing process itself is mostly a trial and error method which attempts to satisfy the travel desires of the community. Although the routing method is mostly trial and error, there are a number of types of routing that can be used. The following discussion of routing is taken from the publication Mass Transit Management: A Handbook for Small Cities which was compiled at the Institute for Urban Transportation at Indiana University.⁵

Routing

Basically, routing is of two types: through-routing and cycle-routing.

Through-routing is simply routing the vehicles from one side of town to the other--generally through the central business district.

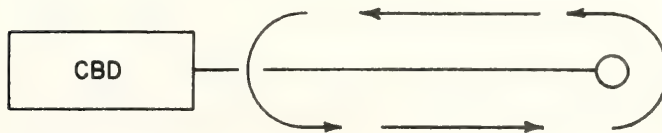


THROUGH - ROUTING

Cycle-routing is running the buses into the central business district and routing them back out over the same line, usually at a fixed interval. Both of these plans allow arrivals at the central business district to be scheduled for convenient transfers to other lines.

Through-routing will minimize the number of passengers who must transfer at the central business district to complete their trips. On the other hand, if a service interruption occurs, two lines are affected rather than one.

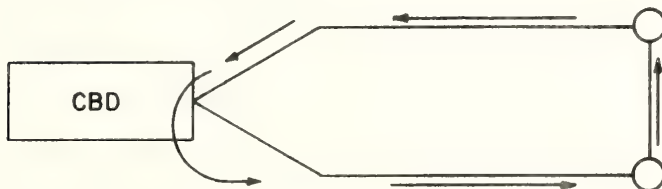
Cycle-routing simplifies scheduling somewhat, but it forces more passengers to transfer from one line to another. If through traffic is heavy, through-routing is preferable because it minimizes time, energy and money costs.



CYCLE - ROUTING

In some areas, a type of routing called reverse-routing is used. This technique involves shunting an outbound run to a formerly

separate adjacent line for the inbound run. The ordinary plan, of course, is to provide service both outbound and inbound over the same route. The reverse-routing plan has the advantage of reducing bus-miles-operated, since one bus seems to do the work of two. On the other hand, only half the work is being performed. Obviously, this use of routing is not designed to increase ridership. A passenger on the outbound portion of the route who wishes to go to the central business district is forced to board the outbound bus, ride it to the end of the outbound line, ride the loop, and then ride in to the center of town, which has the effect of increasing the passenger's time and energy costs. The cost savings of reverse-routing may thus be offset by revenue losses as riders find alternative means of making trips.

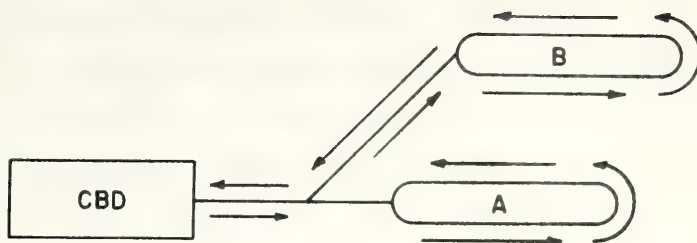


REVERSE - ROUTING

Reverse-routing is a tool that should be used sparingly and judiciously. Loops should never have layovers at the end of the outbound runs, and they should in every case have short running times over the loop portion of the trip.'

Balloon-routing is a useful tool for outlying areas....This type of routing is used at the outlying end of a line to serve residential areas.

As can be seen from the illustration, more than one residential area can be served in this manner. The use of balloon-routing results in "fine-grained" service in the area served. In fact, if the residential areas take the character of reasonably small subdivisions, the



BALLOON - ROUTING

balloon-routing technique can be regarded almost as door-to-door service. Balloon-routing is a very consumer-oriented technique, and it should be used wherever possible.

Recently, a new type of system has been used in small areas which does not require the conventional type routing. The system is referred to by many names such as Dial-A-Bus, demand-actuated transportation, etc. It operates similar to a taxi in that passengers phone into the transit company for a ride. However, a small mini-bus is used and more than one rider is picked up on each trip. The number of riders picked up will depend on the destinations of the persons on-board. Generally, the first passenger picked up must be delivered to his destination within 15 to 20 minutes after the time he was picked up. This type of service is very marketable in that it is a door-to-door type service. However, since the level of service is high the cost is somewhat higher than that on a regular transit system. However, the cost is less

than that for a taxi.

This system appears to have great potential for use in small, low density areas, particularly where daily ridership is low, thus permitting hand scheduling. This system has been recommended for use in Lafayette during the off-peak hours. Not only does this system provide a high level of service, but it may reduce the vehicle operating costs during the off-peak hours since less vehicles may be necessary. A good source of additional information on this type of system is Highway Research Board Special Report 124 titled Demand-Actuated Transportation Systems.

At the same time routing is being designed, it is necessary to consider the scheduling process. The type of schedule developed will depend not only on the routing but also on the type and level of service to be provided. A few guidelines for scheduling are provided below.⁶

GUIDELINES FOR SCHEDULING

(1) Scheduling is a most important marketing variable. In the firm's marketing strategy, it is designed, in conjunction with other marketing tools, to hold customers who have been enticed to use the service.

(2) Schedules should be simple and easy to remember. The passengers are not scheduling experts. Simplicity is also helpful to the operating employees (drivers and dispatchers alike). Scheduling should not require highly skilled people nor a computer, in keeping with the restrictions on available funds.

(3) For cities of under 100,000 in population, headways of 30 minutes should meet the needs, although this idea should be carefully evaluated for each and every route. For larger cities, headways should be shortened.

(4) From a financial standpoint, it is probably impossible to have very frequent headways (i.e., in the five-minute range), which makes careful drawing and scrupulous maintenance of schedules extremely important.

(5) Schedules should be coordinated so that transferring is made as convenient to the rider as possible. Waiting time at transfer points should be minimized.

(6) Schedules attempting to appeal to certain riders should be made in such a way that these riders are actually being served. Buses that make work-related trips cannot be scheduled to arrive at the work place five minutes after the starting time.

(7) Schedules should be checked constantly to assure that they are being kept. Schedules should be reliable.

(8) Schedules and schedule changes should be publicized.

(9) Schedules should be continuously reviewed as an on-going activity of the firm. All changes should be evaluated in terms of their marketing implications.

Once the assumptions have been established and the routing alternatives designed, it will then be possible to develop alternative systems using different levels of service and different types of equipment. It would be a good idea for the study group to provide a cost break down and description of each alternative. This will be very helpful to the decision makers in their evaluation. Two of the alternatives developed in the Lafayette study are provided in Appendix H.

After the alternatives have been developed the study group should analyze each according to five areas. The

first area is the performance of the system. Included here would be such things as meeting the objectives for transit in the community, level of service, flexibility, etc. The second area of evaluation is the economics of the system such as, initial cost, yearly operating cost, fare structure, etc. The third area for analysis is the political acceptability of the alternatives. The fourth area of evaluation is the financing possibilities. How much can be financed from federal grants, etc. Also, how much subsidy, if any, will be required and where will this subsidy come from? The last area that should be evaluated is the environmental effects of each alternative, such as the pollution controls present on equipment, aesthetics, etc. Each of these areas should be evaluated and the results presented to the decision makers along with each alternative. Where possible, information should be tabulated or put in a form that will aid in the analysis. Tables 11 and 12 show one way that some information might be presented to the decision makers.

Notes

¹Institute for Urban Transportation, Graduate School of Business, Indiana University, Mass Transit Management: A Handbook for Small Cities, Director George M. Smerk (Bloomington, Indiana, February, 1971), p. 19.

²Ibid., p. 20.

³Joint Highway Research Project, Purdue University, The Greater Lafayette Area Bus Transit Study, Project director Kenneth W. Heathington (Civil Engineering Building, Lafayette, Indiana 47907, April, 1971), pp. 106-108.

TABLE 11
SUMMARY OF ALTERNATIVES⁷

Alternative	Total Initial Investment ^{a,b}	Capital Recovery Cost (Annual)	Operational Cost (Annual)	Total Cost (Annual)	Level of Service ^c	No. and Type of Buses ^d
1	\$251,452	\$34,700	\$172,600	\$207,300	I	6M, 1XL
2	278,148	36,900	177,400	214,300	I	2L, 4M, 1XL
3	304,844	39,100	182,200	221,300	I	4L, 2M, 1XL
4	331,540	41,500	187,200	228,700	I	6L, 1XL
5 ^a	251,452	34,700	206,700	241,400	I	6M, 1XL
6 ^a	312,492	40,100	234,700	274,800	I	6M, 7S, 1XL
7 ^a	392,580	63,800	223,400	287,200	I	6L, 7S, 1XL
8 ^a	334,684	52,400	259,300	311,700	II	12M, 1XL
9	334,684	52,400	286,400	338,800	II	12M, 1XL
10 ^a	395,724	74,900	269,000	343,900	II	12M, 7S, 1XL
11 ^a	316,460	71,600	335,300	406,900	II	17S, 1XL
12	358,760	45,300	208,800	254,100	III	7L, 1XL
13	413,200	54,200	261,600	315,800	III	9L, 1XL
14	494,860	66,500	308,900	375,400	IIIA	12L, 1XL

a Demand-responsive during off peak. Demand responsive fares are assumed to be \$.10 higher than the fare shown in Table which is peak hour or base fare for fixed route, fixed schedule service.

b Includes \$25,000 for 5 acres of land, \$105,000 for facilities. Also includes buses, fare boxes, and radios.

c Level of Service

I - Present routes and schedules

II - Present routes, reduced headways

III - Extension of area of coverage

IIIA - Extension of area of coverage and reduced headways

d XL - 45 passenger bus, L - 33 passenger bus, M - 18-23 passenger bus, S - 12 passenger bus.

TABLE 12
SUMMARY OF ALTERNATIVES^a

Alternative	Present Passengers (Annual)	Using Present No. of Passengers, Fixed Schedule Fare to Equal		Maximum No. of Passengers for System with 1.5 Load Factor During Peak (Annual) ^a	Using Maximum No. of Passengers, Fixed Schedule Fare To Equal		Increase in Passengers Over Present
		Total Cost	Operational Cost		Total Cost	Operational Cost	
1	428,000	\$.48	\$.40	715,000	\$.29	\$.24	75%
2	428,000	.50	.41	665,000	.32	.26	55%
3	428,000	.52	.43	865,000	.26	.21	102%
4	428,000	.53	.44	1,075,000	.21	.19	151%
5 ^a	428,000	.52	.44	715,000	.29	.24	75%
6 ^a	428,000	.60	.51	715,000	.34	.28	75%
7 ^a	428,000	.63	.48	1,075,000	.22	.16	151%
8 ^a	428,000	.69	.57	1,430,000	.17	.13	234%
9	428,000	.79	.67	1,430,000	.24	.20	234%
10 ^a	428,000	.76	.59	1,430,000	.19	.14	234%
11 ^a	428,000	.91	.74	1,100,000	.32	.26	157%
12	428,000	.59	.49	1,200,000	.21	.17	180%
13	428,000	.74	.61	1,430,000	.22	.18	234%
14	428,000	.88	.72	2,150,000	.17	.14	402%

^a Total computed assuming all buses during peak loaded to 1.5 seated capacity and off peak demand adjusted by factor obtained from ratio of present peak hour demand to above calculated demand.

⁴NCUT, National Committee on Urban Transportation, Better Transportation for Your City (Public Administration Service, 1313 East Sixtieth Street, Chicago 37, Illinois, 1958), p. 51.

⁵Institute for Urban Transportation, pp. 214-216.

⁶Ibid., p. 223.

⁷Kenneth W. Heathington, Gilbert T. Satterly, Jr., and William L. Grecco, Public Transportation for Small Urban Areas (Prepared for presentation at the 51st Annual Meeting of the Highway Research Board, January, 1972, Joint Highway Research Project, Purdue University, Civil Engineering Building, Lafayette, Indiana 47907), p. 29.

⁸Ibid., p. 30.

Selected References

Highway Research Board, Special Report 124, Demand-Actuated Transportation Systems, 2101 Constitution Avenue, Washington, D.C. 20418, 1971.

Thomas, Edwin N., and Schofer, Joseph L., Strategies for the Evaluation of Alternative Transportation Plans, Highway Research Board, National Cooperative Highway Research Program, Report 96, 2101 Constitution Avenue, Washington, D.C. 20418, 1970.

Transportation Development Agency, Ministry of Transport, in association with Ecole Polytechnique of Montreal, Dial-A-Bus Guidelines for Design and Implementation, 2085 Union, Montreal 111, Quebec, Canada, 1972.

CHAPTER VII. SELECTION OF ALTERNATIVE

After the study group has completed the development of alternative systems, a copy of each alternative should be distributed to the members of the policy committee and the citizens advisory committee. The committee members should also be provided with a copy of the information used to develop the alternatives as well as the results of the study groups' evaluation of each alternative. With this information the committee members will be able to make their own evaluation.

Before making the evaluation it would be helpful to go over the goals and objectives that were developed at the beginning of the study. Keeping this in mind the committee members should then evaluate each alternative according to the following five areas.

1. System Performance: Does the alternative system provide an adequate level of service? This covers such things as headways, travel speed, area coverage, seating capacity, reliability, etc.

2. Economic and Other Costs: Are the system costs acceptable? Can the system pay for itself from the farebox? If not, how large a subsidy will be necessary? Is the fare structure acceptable? Along with the monetary costs there

are social costs. Are there areas not served? Are there specific groups not adequately served such as the elderly, the handicapped, and the young? If so, what effect will this have on the community?

3. Financing: How much financing will be needed to implement the system and what will be the source of the financing? What are the requirements for each source of financing? Will additional financing be required for replacement of equipment in the future?

4. Political: Is the proposed system politically acceptable? Will the system need local funding and is the levying of a tax possible? Does the system serve all areas and specific groups? Does the system serve more than one political area? If so, is each area provided with the same level of service, etc?

5. Environmental: Does the equipment recommended meet pollution standards? Also, is the equipment design pleasing both inside and out? If new facilities are to be built, is the site acceptable from an aesthetic as well as an environmental viewpoint?

After the committees have had time to study the alternatives, they should meet with the study director. At this meeting the study director can go over the reasons that the study group had favoring the alternative that they recommended. The committee members can then ask questions and make recommendations.

The selection of an alternative to be implemented should not be made at this meeting. The study director should make note of all the committees' recommendations. The study director should present the alternatives and the committee recommendations to the decision makers of the area. At this meeting the decision makers should have open discussion of the alternatives and recommendations. At this time changes might be made in the alternatives as well as developing new alternatives. If the decision makers are to select an implementable alternative, they must become familiar with each alternative and its ability to meet the needs of the community. It may be necessary to combine parts of various alternatives or develop new ones in order to develop a system that meets the needs of the community. In any case, the decision makers must avoid the pitfall of unquestioningly accepting the recommendation of the study group.

The decision as to whether the community has transit and if so, the particular system chosen must rest with the decision makers of the area. As the elected representatives of the community they must make the final decision but they must not treat this decision lightly, for they and the community will have to live with this decision in the future.

Selected References

Schimpeler, Charles C., and Grecco, William L., "Systems Evaluation: An Approach Based on Community Structure and Values," Highway Research Record, No. 238, Highway Research Board, 2101 Constitution Avenue, Washington, D.C. 20418, 1968, pp. 123-152.

Thomas, Edwin N., and Schofer, Joseph L., Strategies for the Evaluation of Alternative Transportation Plans, Highway Research Board, National Cooperative Highway Research Program, Report 96, 2101 Constitution Avenue, Washington, D.C. 20418, 1970.

CHAPTER VIII. IMPLEMENTATION

Once an alternative has been chosen, it is necessary to establish an implementation program. This program will essentially be a time schedule for implementing the system changes called for in the chosen alternative. As many of the system changes as possible should be implemented at one time. This is particularly true for any route and schedule changes.

The exact timetable for implementation will depend on a number of factors. The largest factor will be the source of funding and the time required to obtain this funding. If federal funding is desired, the city must work closely with UMTA to make sure they meet all of UMTA's requirements for funding. A sample application from the Lafayette study is provided in Appendix I. It is possible for the city to obtain from UMTA two-thirds of the funding needed for the system changes, however, the city will have to provide the other one-third. Therefore, the time needed for implementation will depend not only on the time needed to obtain federal funding but also the time needed to secure the local share.

Once funding has been secured it is then necessary to obtain bids for the new equipment to be purchased. Each

company bidding must be provided with a copy of the specifications and the bid forms. A sample of the ones used in the Lafayette study is provided in Appendix G. After a bid has been accepted, the equipment can be ordered, but it may take as long as six months for the production and delivery of the equipment.

All the above factors must be kept in mind when setting up the implementation program. After a timetable has been set up, it will take continued coordination among all parties concerned to make sure the time schedule is met.

While the above tasks are being carried out, the study group should be working on the advertising campaign to be used to market the transit product. Extensive use should be made of all advertising media in promoting the new system. This extensive campaign should be aimed at the date for the implementation of most of the system changes. Many cities have had short ceremonies at the town square to promote the new system. A number of things have been done at these ceremonies such as introducing the drivers for each route, presenting the drivers with new uniforms, a speech by the mayor promoting the new system, a ribbon cutting ceremony that starts the new system, giving free rides on the first day, etc. The main idea is to get the public involved and to let them know that there is a new system aimed at better serving the public.

After the initial implementation the use of advertising can be reduced, however, a moderate advertising campaign

should be continued. This campaign should include such things as newspaper ads, posters promoting special services or routes, complimentary passes to new residents, the periodic mailing of schedules and route maps, etc. The transit system might be kept in the news through such things as the selection of a driver of the month with his picture and a short biography placed in the newspaper, the description of any additional changes in the system such as the installation of a bus washing machine, etc. The idea here is to continue to remind the public that the transit system is geared to serving them.

Along with the marketing of transit is the need for continuous monitoring and evaluation of the system. This is necessary to maintain and possibly improve the level of service. All routes must be periodically checked to make sure the drivers are maintaining schedules, that the buses are not overcrowded, that transfers can be made, etc. An evaluation should be made of possible extensions of routes as well as the establishment of new routes. As time goes on people will change their travel patterns, neighborhoods will change, and activity centers will change, thus necessitating route changes. If the transit system is to continue to provide a high level of service to the community, it must be willing and able to change. The only way to do this is to continually evaluate the transit system and make the necessary changes to meet the needs of the community.

Selected References

Institute for Urban Transportation, Graduate School of Business, Indiana University, Mass Transit Management: A Handbook for Small Cities, Director George M. Smerk, Bloomington, Indiana, February, 1971.

Schneider, Lewis M., Marketing Urban Mass Transit, Division of Research, Graduate School of Business Administration, Harvard University, Boston, Massachusetts, 1965.

CHAPTER IX. ACQUISITION OF TRANSIT OPERATIONS BY A CITY

In most cases the city will not have the time for planning before it is faced with taking over bus transit operations from a private operator. This happens because the city usually doesn't consider taking over the operations until the private operator has decided to go out of business or asks the city for financial assistance.

If the private operator has decided to go out of business, the city must purchase the operations quickly in order to insure continued operation. In this situation there is little time for evaluation of the operations being purchased. However, if the city is afforded the time to evaluate the system and to negotiate with the operator, the following considerations should be made.¹

A. The requirements of state and local laws governing the purchase and operation of transit facilities by a city should be determined. The city must find out the options it has available. Can bus transit be operated as a city department? Can the city set up a transit authority? Can the city subsidize transit operations? What are the geographic limits to a city or authority operated transit system? Can the city or an authority levy a tax to support operations? Can the city or an authority use the power of eminent domain

to acquire transit properties? These are just a few of the legal questions the city must answer before it actually acquires transit operations from a private operator.

B. At least two appraisals should be obtained as to the value of the property and equipment of the private operator. This information will be helpful in determining exactly what facilities are available for purchase as well as the condition of those facilities. Sample appraisals are shown in Table 13 and Figure 16. This information will be helpful if negotiations are made with the private operator or if eminent domain is used to acquire the property. It would be desirable to determine if the present property on which bus garage and terminal are located is large enough for expansion of the facilities in the future. The city might also find out what land it has available for possible use as the site of new facilities if the present facilities are felt to be inadequate.

C. The availability of federal assistance for the purchase and improvement of facilities should be determined. It is important that the city find out the requirements that must be met to qualify for a federal grant or loan. This information can be obtained from the Urban Mass Transportation Administration in Washington, D.C. A sample application from the Lafayette study is provided in Appendix I. The city should also consider other means of obtaining funds at this time such as the issuance of bonds and the levying

TABLE 13

BOOK VALUES OF UTC PROPERTY INVOLVED IN PROSPECTIVE SALE TO
RHODE ISLAND PUBLIC TRANSIT AUTHORITY²

	Book Cost	Depreciation to 12/31/64	Book Value as of 12/31/64
Land	\$ 359,764	—	\$ 359,764
Buildings	1,832,707	\$ 809,118	1,023,589
Tunnel	1,004,763	—	1,004,763
Other Structures	69,886	47,537	22,349
Grading & Paving	19,436	12,288	7,148
Communications System	43,701	30,861	12,840
Revenue Equipment — Gas Buses	475,544	474,188	1,356
Revenue Equipment — Diesel Buses	2,184,525	1,343,372	841,153
Service Cars & Equipment	81,925	67,229	14,696
Shop & Garage Equipment	197,080	177,787	19,293
Furniture & Office Equipment	140,868	120,343	20,525
Miscellaneous Equipment	3,271	3,271	—
Improvements to Leasehold Property	35,123	29,752	5,371
	<u>\$6,448,593</u>	<u>\$3,115,746</u>	<u>\$3,332,847</u>
Adjustments One-half of parcel No. 12	\$ 26,978		
U.T. & B.S. Co. Bldg	102,268		
112 Overage buses	<u>162,831</u>		
Property Excluded From Sale			292,077
Physical Assets to be Acquired			<u>3,040,770</u>
Estimated Value of Materials and Supplies			<u>\$ 176,858</u>
Book Value of Property Involved in Prospective Sale			<u>\$3,217,628</u>

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Member: Multiple Listing Service

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Dec. 9, 1970.

Appraised Estimate of Value:

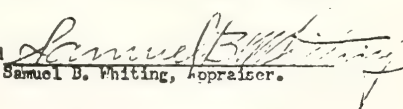
Bus barn and two lots known as No. 1396 S. Gilbert St., Iowa City, Iowa consisting of two lots each 100 by 186 feet in size, making a tract of 37,200 square feet with 100 feet of frontage on S. Gilbert Street and 100 feet of frontage on Highland Court.

Legal description: Lots 11 and 20 of Highland Park Addition to Iowa City, Iowa.

Summary of estimated values for property on Dec. 9, 1970:

Value of the land including the street improvements-----	\$31,260.00
Depreciated value of the building excludng the compressor-----	\$61,471.00
Value today of cement drives and cement slab east of building-----	\$029.12
Value today of black top surfacing(depreciated value)-----	\$3,659.00
Depreciated value of the rock surfacing on this lot-----	\$305.06
Depreciated value of the 10,000 gal. underground gas storage tank ----	\$900.00
Depreciated value of the gasoline pump-----	\$275.00
Total estimated value of this property-----	\$93,772.22
Rounded to the nearest \$100 would be-----	\$93,800.00

Signed


 Samuel B. Whiting, Appraiser.

Explanation of the above estimates are shown on the next two pages.

FIGURE 16

SAMPLE APPRAISAL OF TRANSIT FACILITIES³

of a tax. These funds may be necessary to meet the matching requirements of a federal grant as well as to subsidize the present operation.

D. The city should make an agreement with the private operator to continue operating the bus system until the city can arrange for the purchase of the operations. It might be necessary for the city to subsidize the operations by covering the private operators losses over this period. This may be expensive, however, it will give the city time to complete its evaluations and other arrangements before actually taking over the transit operations.

E. As was pointed out in the first chapter, it will be necessary to determine if a new management team will be needed to manage and operate the transit system once the city assumes ownership. If new management is needed, the city should begin to look for a manager immediately. It will be beneficial for the new manager to have time to become acquainted with the operations before the city actually takes over the operation of the system.

F. There are a number of economic and administrative details that must be evaluated. If the transit system is to become a city department, its employees may come under city employment conditions. The city will also have to take over the accounting and budgetary tasks of the transit system. These will probably have to be changed to meet the standards and procedures used by the city. The city must look into the

insurance and safety programs that are being used. These programs will have to be changed to fit into the city programs. These are just a few of the administrative and procedural changes that will need to be made before the city takes over operation of the transit system.

G. If the transit employees are members of a union, the city must look into the present pay structure and benefits of the employees. The city will have to review the promotion and pay structure as well as the benefits such as insurance, sick leave, retirement, etc. It is important to find out how much these benefits cost. If the city obtains funds from UMTA it will have to sign a 13(c) agreement as one of the requirements. A sample 13(c) agreement from the Lafayette study is provided in Appendix J. By signing this agreement the city states that the present employees will not be put in a worse position due to city ownership. Essentially, this means that the city will have to maintain all programs presently in effect or may be able to negotiate with the union for changes.

The above considerations are not all inclusive but are probably the main considerations that will need to be made. Obviously, the type and number of considerations will vary from city to city depending on its size, location, etc.

After the city has evaluated the transit operations and the legal requirements for purchase and operation, it can proceed with negotiations for the purchase of the transit

operations. The final purchase agreement must be spelled out in a formal contract between the city and the private operator. A sample contract is shown in Appendix K.

During the process of acquisition of transit operations numerous questions will be raised concerning the type of operation by the city such as city department, transit authority, etc., as well as the method of financing. The answers to these questions usually evolve from a consideration of the goals and objectives of the community. The development of these goals and objectives is discussed in the chapter on Establishing Goals, Objectives, and Criteria for Evaluation.

Applying for Federal Assistance

If the city wishes to obtain federal assistance in financing bus transit, it should contact UMTA (Urban Mass Transportation Administration, U.S. Department of Transportation, Washington, D.C. 20590) as soon as possible. At this initial contact it will be possible to obtain information on the types of assistance that are available and the requirements that the city must meet for each.

Most cities will wish to apply for a capital grant which can cover up to two-thirds of the cost in purchasing new rolling stock, facilities, and land. Although the UMTA requirements for a capital grant may change from time to time, the following items will generally be required in the Preliminary Application.^{4,5,6}

Letter of Application: This is a cover letter that briefly describes the general purpose of the grant, the equipment, facilities, and land to be purchased, and the total amount of the grant requested. The letter should be signed by an authorized representative of the city or by the chairman of the transit authority if one has been established.

1. This section provides a detailed description of the equipment, facilities, and land which are to be purchased with the grant. This information will probably be based on the results of a transit study.

2. A description of the transportation system in which the equipment, facilities, and land will be used. Included in this section might be such things as a general description of the area emphasizing the employment and general economic atmosphere. Also, included here would be a description of the present transit system and the proposed changes in service and facilities.

3. This section describes the benefits that are expected to accrue from the purchase of new equipment and facilities. These benefits would include such things as an increased level of service due to shorter headways, more area coverage, more reliable service, etc. Benefits should also

be related to the overall transportation system such as reducing congestion, decreasing the amount of parking space needed, etc.

4. This section provides a break down of the estimated total cost of the project. This section should include things like the costs of new rolling stock, new or improved facilities, and land.

5-7. Sections 5-7 provide estimates of the portion of the project cost that can be funded from revenues, or other local and state sources. Described in these sections are the ways in which the local area is to obtain funds to cover that part of the project cost that cannot be covered by revenues or an UMTA grant.

8. This section provides a description of the various types of planning that exist in the area. This includes such things as land-use and economic planning as well as a description of the transportation planning that has been done to provide for mobility throughout the area. Also listed are the agencies responsible for planning in the urban area.

9-10. Sections 9-10 are concerned with the development of a system for coordinating mass transportation in the urban area such as a transit authority. Also, it is necessary here to insure

that the public will control the operation and use of the transit facilities whether they are privately or publicly operated.

11. This section describes the affects that the transit system will have on the present employees of the system as well as the employees of other transportation systems in the area. All transportation systems and labor unions that are involved must be identified. The rights of employees must be protected according to the conditions set up in Section 13(c) of the Urban Mass Transportation Act. A copy of the 13(c) agreement from the Lafayette study is provided in Appendix J. If any families, businesses, or organizations must be relocated, they must be identified and the reasons for the relocation explained.

12. This section provides a Draft Environmental Statement which lists the impact which the proposed project will have on the surrounding environment. Included here would be such things as whether the equipment purchased will meet federal emission standards, expected short-term and long-term impacts on the local area or land occupied by the transit facilities, and any expected loss of resources in the area. Any objections raised at the federal, state, or local levels must also be included here.

The above items are not provided to be followed in making an application but to give the city an idea of the general requirements which must be met to qualify for an UMTA grant. A sample application from the Lafayette study is provided in Appendix I. If the city decides to apply for an UMTA grant it should contact UMTA for a set of up-to-date requirements.

Notes

¹James Ridella, Publication Associate, International City Managers' Association, Report No. 277, Municipal Transit Systems: Problems and Prospects (Management Information Service, 1140 Connecticut Avenue N.W., Chicago, Illinois February, 1967), p. 11.

²Simpson and Curtin, Transportation Engineers, 1405 Locust Street, Philadelphia, Pennsylvania 19102, Acquisition and Public Operation of Transit Services in Providence-Pawtucket Metropolitan Area (Prepared for the Rhode Island Public Transit Authority, Providence, Rhode Island, June, 1965), p. 49.

³Kenneth J. Dueker and James Stoner, Mass Transit Technical Study: Iowa City (Institute of Urban and Regional Research, The University of Iowa, Iowa City, Iowa, September, 1971), p. 85.

⁴U.S. Department of Transportation, Urban Mass Transportation Administration, Capital Grants for Urban Mass Transportation (Washington, D.C. 20590, November, 1970), pp. 11-16.

⁵Greater Lafayette Public Transportation Corporation, Preliminary Application for a Capital Grant from the Urban Mass Transportation Administration (324 Ferry Street, Lafayette, Indiana 47907, December 14, 1971), pp. 1-23.

⁶Institute for Urban Transportation, Graduate School of Business, Indiana University, Mass Transit Management: A Handbook for Small Cities, Director George M. Smerk (Bloomington, Indiana, February, 1971), pp. 53-56.

CONCLUSIONS

This report has attempted to cover the complete transit planning process for small urban areas. Undoubtedly a few areas may have been missed and others may have to be supplemented with additional references. It is believed that the report coupled with the listed references will provide cities with the process required to adequately plan for the community's transit needs.

It must be re-emphasized that the city must assess its capabilities before embarking on a course of action. These guidelines were developed to aid the city's personnel in conducting a transit study or to evaluate the work of a consultant. Again the final decision as to who conducts the study must rest with the city's decision makers.

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- 3A Measuring Traffic Volumes
- 3B Determining Travel Time
- 3C Conducting a Limited Parking Study
- 3D Conducting a Comprehensive Parking Study
- 3E Maintaining Accident Records
- 4A Measuring Transit Service
- 5A Inventory of the Physical Street System
- 6A Financial Records and Reports
- 6B Cost Accounting
- 7A Standards for Street Facilities and Services
- 8A Standards for Transit Facilities and Services
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- 11A Improving Transportation Administration
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APPENDICES

Appendix A

This appendix contains a number of sample on-board questionnaires that have been used in various transit studies throughout the United States. Also, provided is a sample load data sheet from the Lafayette study.

TS-7

PLEASE PRINT

Nº 10307

1. Where did you get on THIS bus?

Street Intersection or Name of Building

City or Town

Please do not write
in this space.

6 10

2. How did you get to THIS bus?

☐ Transferred from another bus ☐ Walked ☐ Car ☐ Other

11

3A. Where did you come FROM? (check one)

☐ Home ☐ Personal Business or Appointment
☐ Work ☐ Social, Recreation, Entertainment
☐ School ☐ Other _____
☐ Shopping

12

B. Where is the place you came FROM?

Approximate Street Address or Name of Building

City or Town

13 17

4. Where will you get off THIS bus?

Street Intersection or Name of Building

City or Town

18 22

5. Will you transfer to another bus to get to your destination?

☐ Yes ☒ Route No. _____
☐ No

23

24 25

6A. Where are you GOING? (check one)

☐ Home ☐ Personal Business or Appointment
☐ Work ☐ Social, Recreation, Entertainment
☐ School ☐ Other _____
☐ Shopping

26

B. Where is the place you are GOING?

Approximate Street Address or Name of Building

City or Town

27 31

7. How many cars do you have in your household?

☐ No cars ☐ 1 car ☐ 2 or more cars

32

8. Was a car available to you for this trip?

☐ Yes ☐ No

33

9. Are you?

☐ Male ☐ Female

34

10. To what age group do you belong?

☐ 14 or under ☐ 25 - 44
☐ 15 - 19 ☐ 45 - 64
☐ 20 - 24 ☐ 65 or over

35

11. What is your yearly family income?

☐ Less than \$3,000 ☐ \$6,000 - \$8,000
☐ \$3,000 - \$4,000 ☐ \$8,000 - \$10,000
☐ \$4,000 - \$6,000 ☐ More than \$10,000

36

37

PLEASE RETURN TO INTERVIEWER - THANK YOU

FIGURE A1
SAN DIEGO TRANSIT CORPORATION ENGLISH QUESTIONNAIRE¹

WE CAN HELP IMPROVE BUS SERVICE BY ANSWERING ALL OF THE FOLLOWING QUESTIONS. PLEASE DROP IN CONTAINER AT DOOR OR RETURN TO INTERVIEWER. (IF NO RETURN, PLEASE COMPLETE CARD HERE. PLEASE FINISH LATER AND DROP IN ANY MAIL BOX. NO POSTAGE REQUIRED.)

THANK YOU

1. WHERE DID YOU GET ON THIS BUS?

STREET INTERSECTION CITY OR TOWN

2. HOW DID YOU GET TO THE BUS STOP WHERE YOU BOARDED THIS BUS?

WALK ☐ AUTO ☐ OTHER BUS ☐

3. WHERE DID YOU COME FROM BEFORE GETTING TO THE BUS STOP (STREET ADDRESS OR NAME OF BUILDING)

STREET ADDRESS OR NAME OF BUILDING CITY OR TOWN

4. WAS THIS YOUR HOME? (Check one) YES ☐ NO ☐

5. WHERE WILL YOU GET OFF THIS BUS?

STREET INTERSECTION CITY OR TOWN

6. HOW WILL YOU GET TO YOUR DESTINATION AFTER LEAVING THIS BUS? (Check one) WALK ☐ AUTO ☐ OTHER BUS ☐

7. WHERE IS THE PLACE YOU ARE GOING? (STREET ADDRESS OR NAME OF BUILDING)

STREET ADDRESS OR NAME OF BUILDING CITY OR TOWN

8. IS THIS YOUR HOME? (Check one) YES ☐ NO ☐

9. WHAT IS THE PURPOSE OF YOUR TRAVEL TODAY?

SCHOOL ☐ BUSINESS ☐ SHOPPING ☐ VISITING ☐ OTHER ☐

10. HOW MANY CARS IN OPERATING CONDITION DO YOU HAVE IN YOUR HOUSEHOLD? (Check one) 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15 ☐ 16 ☐ 17 ☐ 18 ☐ 19 ☐ 20 ☐ 21 ☐ 22 ☐ 23 ☐ 24 ☐ 25 ☐ 26 ☐ 27 ☐ 28 ☐ 29 ☐ 30 ☐ 31 ☐ 32 ☐ 33 ☐ 34 ☐ 35 ☐ 36 ☐ 37 ☐ 38 ☐ 39 ☐ 40 ☐ 41 ☐ 42 ☐ 43 ☐ 44 ☐ 45 ☐ 46 ☐ 47 ☐ 48 ☐ 49 ☐ 50 ☐ 51 ☐ 52 ☐ 53 ☐ 54 ☐ 55 ☐ 56 ☐ 57 ☐ 58 ☐ 59 ☐ 60 ☐ 61 ☐ 62 ☐ 63 ☐ 64 ☐ 65 ☐ 66 ☐ 67 ☐ 68 ☐ 69 ☐ 70 ☐ 71 ☐ 72 ☐ 73 ☐ 74 ☐ 75 ☐ 76 ☐ 77 ☐ 78 ☐ 79 ☐ 80 ☐ 81 ☐ 82 ☐ 83 ☐ 84 ☐ 85 ☐ 86 ☐ 87 ☐ 88 ☐ 89 ☐ 90 ☐ 91 ☐ 92 ☐ 93 ☐ 94 ☐ 95 ☐ 96 ☐ 97 ☐ 98 ☐ 99 ☐ 100 ☐ 101 ☐ 102 ☐ 103 ☐ 104 ☐ 105 ☐ 106 ☐ 107 ☐ 108 ☐ 109 ☐ 110 ☐ 111 ☐ 112 ☐ 113 ☐ 114 ☐ 115 ☐ 116 ☐ 117 ☐ 118 ☐ 119 ☐ 120 ☐ 121 ☐ 122 ☐ 123 ☐ 124 ☐ 125 ☐ 126 ☐ 127 ☐ 128 ☐ 129 ☐ 130 ☐ 131 ☐ 132 ☐ 133 ☐ 134 ☐ 135 ☐ 136 ☐ 137 ☐ 138 ☐ 139 ☐ 140 ☐ 141 ☐ 142 ☐ 143 ☐ 144 ☐ 145 ☐ 146 ☐ 147 ☐ 148 ☐ 149 ☐ 150 ☐ 151 ☐ 152 ☐ 153 ☐ 154 ☐ 155 ☐ 156 ☐ 157 ☐ 158 ☐ 159 ☐ 160 ☐ 161 ☐ 162 ☐ 163 ☐ 164 ☐ 165 ☐ 166 ☐ 167 ☐ 168 ☐ 169 ☐ 170 ☐ 171 ☐ 172 ☐ 173 ☐ 174 ☐ 175 ☐ 176 ☐ 177 ☐ 178 ☐ 179 ☐ 180 ☐ 181 ☐ 182 ☐ 183 ☐ 184 ☐ 185 ☐ 186 ☐ 187 ☐ 188 ☐ 189 ☐ 190 ☐ 191 ☐ 192 ☐ 193 ☐ 194 ☐ 195 ☐ 196 ☐ 197 ☐ 198 ☐ 199 ☐ 200 ☐ 201 ☐ 202 ☐ 203 ☐ 204 ☐ 205 ☐ 206 ☐ 207 ☐ 208 ☐ 209 ☐ 210 ☐ 211 ☐ 212 ☐ 213 ☐ 214 ☐ 215 ☐ 216 ☐ 217 ☐ 218 ☐ 219 ☐ 220 ☐ 221 ☐ 222 ☐ 223 ☐ 224 ☐ 225 ☐ 226 ☐ 227 ☐ 228 ☐ 229 ☐ 230 ☐ 231 ☐ 232 ☐ 233 ☐ 234 ☐ 235 ☐ 236 ☐ 237 ☐ 238 ☐ 239 ☐ 240 ☐ 241 ☐ 242 ☐ 243 ☐ 244 ☐ 245 ☐ 246 ☐ 247 ☐ 248 ☐ 249 ☐ 250 ☐ 251 ☐ 252 ☐ 253 ☐ 254 ☐ 255 ☐ 256 ☐ 257 ☐ 258 ☐ 259 ☐ 260 ☐ 261 ☐ 262 ☐ 263 ☐ 264 ☐ 265 ☐ 266 ☐ 267 ☐ 268 ☐ 269 ☐ 270 ☐ 271 ☐ 272 ☐ 273 ☐ 274 ☐ 275 ☐ 276 ☐ 277 ☐ 278 ☐ 279 ☐ 280 ☐ 281 ☐ 282 ☐ 283 ☐ 284 ☐ 285 ☐ 286 ☐ 287 ☐ 288 ☐ 289 ☐ 290 ☐ 291 ☐ 292 ☐ 293 ☐ 294 ☐ 295 ☐ 296 ☐ 297 ☐ 298 ☐ 299 ☐ 300 ☐ 301 ☐ 302 ☐ 303 ☐ 304 ☐ 305 ☐ 306 ☐ 307 ☐ 308 ☐ 309 ☐ 310 ☐ 311 ☐ 312 ☐ 313 ☐ 314 ☐ 315 ☐ 316 ☐ 317 ☐ 318 ☐ 319 ☐ 320 ☐ 321 ☐ 322 ☐ 323 ☐ 324 ☐ 325 ☐ 326 ☐ 327 ☐ 328 ☐ 329 ☐ 330 ☐ 331 ☐ 332 ☐ 333 ☐ 334 ☐ 335 ☐ 336 ☐ 337 ☐ 338 ☐ 339 ☐ 340 ☐ 341 ☐ 342 ☐ 343 ☐ 344 ☐ 345 ☐ 346 ☐ 347 ☐ 348 ☐ 349 ☐ 350 ☐ 351 ☐ 352 ☐ 353 ☐ 354 ☐ 355 ☐ 356 ☐ 357 ☐ 358 ☐ 359 ☐ 360 ☐ 361 ☐ 362 ☐ 363 ☐ 364 ☐ 365 ☐ 366 ☐ 367 ☐ 368 ☐ 369 ☐ 370 ☐ 371 ☐ 372 ☐ 373 ☐ 374 ☐ 375 ☐ 376 ☐ 377 ☐ 378 ☐ 379 ☐ 380 ☐ 381 ☐ 382 ☐ 383 ☐ 384 ☐ 385 ☐ 386 ☐ 387 ☐ 388 ☐ 389 ☐ 390 ☐ 391 ☐ 392 ☐ 393 ☐ 394 ☐ 395 ☐ 396 ☐ 397 ☐ 398 ☐ 399 ☐ 400 ☐ 401 ☐ 402 ☐ 403 ☐ 404 ☐ 405 ☐ 406 ☐ 407 ☐ 408 ☐ 409 ☐ 410 ☐ 411 ☐ 412 ☐ 413 ☐ 414 ☐ 415 ☐ 416 ☐ 417 ☐ 418 ☐ 419 ☐ 420 ☐ 421 ☐ 422 ☐ 423 ☐ 424 ☐ 425 ☐ 426 ☐ 427 ☐ 428 ☐ 429 ☐ 430 ☐ 431 ☐ 432 ☐ 433 ☐ 434 ☐ 435 ☐ 436 ☐ 437 ☐ 438 ☐ 439 ☐ 440 ☐ 441 ☐ 442 ☐ 443 ☐ 444 ☐ 445 ☐ 446 ☐ 447 ☐ 448 ☐ 449 ☐ 450 ☐ 451 ☐ 452 ☐ 453 ☐ 454 ☐ 455 ☐ 456 ☐ 457 ☐ 458 ☐ 459 ☐ 460 ☐ 461 ☐ 462 ☐ 463 ☐ 464 ☐ 465 ☐ 466 ☐ 467 ☐ 468 ☐ 469 ☐ 470 ☐ 471 ☐ 472 ☐ 473 ☐ 474 ☐ 475 ☐ 476 ☐ 477 ☐ 478 ☐ 479 ☐ 480 ☐ 481 ☐ 482 ☐ 483 ☐ 484 ☐ 485 ☐ 486 ☐ 487 ☐ 488 ☐ 489 ☐ 490 ☐ 491 ☐ 492 ☐ 493 ☐ 494 ☐ 495 ☐ 496 ☐ 497 ☐ 498 ☐ 499 ☐ 500 ☐ 501 ☐ 502 ☐ 503 ☐ 504 ☐ 505 ☐ 506 ☐ 507 ☐ 508 ☐ 509 ☐ 510 ☐ 511 ☐ 512 ☐ 513 ☐ 514 ☐ 515 ☐ 516 ☐ 517 ☐ 518 ☐ 519 ☐ 520 ☐ 521 ☐ 522 ☐ 523 ☐ 524 ☐ 525 ☐ 526 ☐ 527 ☐ 528 ☐ 529 ☐ 530 ☐ 531 ☐ 532 ☐ 533 ☐ 534 ☐ 535 ☐ 536 ☐ 537 ☐ 538 ☐ 539 ☐ 540 ☐ 541 ☐ 542 ☐ 543 ☐ 544 ☐ 545 ☐ 546 ☐ 547 ☐ 548 ☐ 549 ☐ 550 ☐ 551 ☐ 552 ☐ 553 ☐ 554 ☐ 555 ☐ 556 ☐ 557 ☐ 558 ☐ 559 ☐ 560 ☐ 561 ☐ 562 ☐ 563 ☐ 564 ☐ 565 ☐ 566 ☐ 567 ☐ 568 ☐ 569 ☐ 570 ☐ 571 ☐ 572 ☐ 573 ☐ 574 ☐ 575 ☐ 576 ☐ 577 ☐ 578 ☐ 579 ☐ 580 ☐ 581 ☐ 582 ☐ 583 ☐ 584 ☐ 585 ☐ 586 ☐ 587 ☐ 588 ☐ 589 ☐ 590 ☐ 591 ☐ 592 ☐ 593 ☐ 594 ☐ 595 ☐ 596 ☐ 597 ☐ 598 ☐ 599 ☐ 600 ☐ 601 ☐ 602 ☐ 603 ☐ 604 ☐ 605 ☐ 606 ☐ 607 ☐ 608 ☐ 609 ☐ 610 ☐ 611 ☐ 612 ☐ 613 ☐ 614 ☐ 615 ☐ 616 ☐ 617 ☐ 618 ☐ 619 ☐ 620 ☐ 621 ☐ 622 ☐ 623 ☐ 624 ☐ 625 ☐ 626 ☐ 627 ☐ 628 ☐ 629 ☐ 630 ☐ 631 ☐ 632 ☐ 633 ☐ 634 ☐ 635 ☐ 636 ☐ 637 ☐ 638 ☐ 639 ☐ 640 ☐ 641 ☐ 642 ☐ 643 ☐ 644 ☐ 645 ☐ 646 ☐ 647 ☐ 648 ☐ 649 ☐ 650 ☐ 651 ☐ 652 ☐ 653 ☐ 654 ☐ 655 ☐ 656 ☐ 657 ☐ 658 ☐ 659 ☐ 660 ☐ 661 ☐ 662 ☐ 663 ☐ 664 ☐ 665 ☐ 666 ☐ 667 ☐ 668 ☐ 669 ☐ 670 ☐ 671 ☐ 672 ☐ 673 ☐ 674 ☐ 675 ☐ 676 ☐ 677 ☐ 678 ☐ 679 ☐ 680 ☐ 681 ☐ 682 ☐ 683 ☐ 684 ☐ 685 ☐ 686 ☐ 687 ☐ 688 ☐ 689 ☐ 690 ☐ 691 ☐ 692 ☐ 693 ☐ 694 ☐ 695 ☐ 696 ☐ 697 ☐ 698 ☐ 699 ☐ 700 ☐ 701 ☐ 702 ☐ 703 ☐ 704 ☐ 705 ☐ 706 ☐ 707 ☐ 708 ☐ 709 ☐ 710 ☐ 711 ☐ 712 ☐ 713 ☐ 714 ☐ 715 ☐ 716 ☐ 717 ☐ 718 ☐ 719 ☐ 720 ☐ 721 ☐ 722 ☐ 723 ☐ 724 ☐ 725 ☐ 726 ☐ 727 ☐ 728 ☐ 729 ☐ 730 ☐ 731 ☐ 732 ☐ 733 ☐ 734 ☐ 735 ☐ 736 ☐ 737 ☐ 738 ☐ 739 ☐ 740 ☐ 741 ☐ 742 ☐ 743 ☐ 744 ☐ 745 ☐ 746 ☐ 747 ☐ 748 ☐ 749 ☐ 750 ☐ 751 ☐ 752 ☐ 753 ☐ 754 ☐ 755 ☐ 756 ☐ 757 ☐ 758 ☐ 759 ☐ 760 ☐ 761 ☐ 762 ☐ 763 ☐ 764 ☐ 765 ☐ 766 ☐ 767 ☐ 768 ☐ 769 ☐ 770 ☐ 771 ☐ 772 ☐ 773 ☐ 774 ☐ 775 ☐ 776 ☐ 777 ☐ 778 ☐ 779 ☐ 780 ☐ 781 ☐ 782 ☐ 783 ☐ 784 ☐ 785 ☐ 786 ☐ 787 ☐ 788 ☐ 789 ☐ 790 ☐ 791 ☐ 792 ☐ 793 ☐ 794 ☐ 795 ☐ 796 ☐ 797 ☐ 798 ☐ 799 ☐ 800 ☐ 801 ☐ 802 ☐ 803 ☐ 804 ☐ 805 ☐ 806 ☐ 807 ☐ 808 ☐ 809 ☐ 810 ☐ 811 ☐ 812 ☐ 813 ☐ 814 ☐ 815 ☐ 816 ☐ 817 ☐ 818 ☐ 819 ☐ 820 ☐ 821 ☐ 822 ☐ 823 ☐ 824 ☐ 825 ☐ 826 ☐ 827 ☐ 828 ☐ 829 ☐ 830 ☐ 831 ☐ 832 ☐ 833 ☐ 834 ☐ 835 ☐ 836 ☐ 837 ☐ 838 ☐ 839 ☐ 840 ☐ 841 ☐ 842 ☐ 843 ☐ 844 ☐ 845 ☐ 846 ☐ 847 ☐ 848 ☐ 849 ☐ 850 ☐ 851 ☐ 852 ☐ 853 ☐ 854 ☐ 855 ☐ 856 ☐ 857 ☐ 858 ☐ 859 ☐ 860 ☐ 861 ☐ 862 ☐ 863 ☐ 864 ☐ 865 ☐ 866 ☐ 867 ☐ 868 ☐ 869 ☐ 870 ☐ 871 ☐ 872 ☐ 873 ☐ 874 ☐ 875 ☐ 876 ☐ 877 ☐ 878 ☐ 879 ☐ 880 ☐ 881 ☐ 882 ☐ 883 ☐ 884 ☐ 885 ☐ 886 ☐ 887 ☐ 888 ☐ 889 ☐ 890 ☐ 891 ☐ 892 ☐ 893 ☐ 894 ☐ 895 ☐ 896 ☐ 897 ☐ 898 ☐ 899 ☐ 900 ☐ 901 ☐ 902 ☐ 903 ☐ 904 ☐ 905 ☐ 906 ☐ 907 ☐ 908 ☐ 909 ☐ 910 ☐ 911 ☐ 912 ☐ 913 ☐ 914 ☐ 915 ☐ 916 ☐ 917 ☐ 918 ☐ 919 ☐ 920 ☐ 921 ☐ 922 ☐ 923 ☐ 924 ☐ 925 ☐ 926 ☐ 927 ☐ 928 ☐ 929 ☐ 930 ☐ 931 ☐ 932 ☐ 933 ☐ 934 ☐ 935 ☐ 936 ☐ 937 ☐ 938 ☐ 939 ☐ 940 ☐ 941 ☐ 942 ☐ 943 ☐ 944 ☐ 945 ☐ 946 ☐ 947 ☐ 948 ☐ 949 ☐ 950 ☐ 951 ☐ 952 ☐ 953 ☐ 954 ☐ 955 ☐ 956 ☐ 957 ☐ 958 ☐ 959 ☐ 960 ☐ 961 ☐ 962 ☐ 963 ☐ 964 ☐ 965 ☐ 966 ☐ 967 ☐ 968 ☐ 969 ☐ 970 ☐ 971 ☐ 972 ☐ 973 ☐ 974 ☐ 975 ☐ 976 ☐ 977 ☐ 978 ☐ 979 ☐ 980 ☐ 981 ☐ 982 ☐ 983 ☐ 984 ☐ 985 ☐ 986 ☐ 987 ☐ 988 ☐ 989 ☐ 990 ☐ 991 ☐ 992 ☐ 993 ☐ 994 ☐ 995 ☐ 996 ☐ 997 ☐ 998 ☐ 999 ☐ 1000 ☐ 1001 ☐ 1002 ☐ 1003 ☐ 1004 ☐ 1005 ☐ 1006 ☐ 1007 ☐ 1008 ☐ 1009 ☐ 1010 ☐ 1011 ☐ 1012 ☐ 1013 ☐ 1014 ☐ 1015 ☐ 1016 ☐ 1017 ☐ 1018 ☐ 1019 ☐ 1020 ☐ 1021 ☐ 1022 ☐ 1023 ☐ 1024 ☐ 1025 ☐ 1026 ☐ 1027 ☐ 1028 ☐ 1029 ☐ 1030 ☐ 1031 ☐ 1032 ☐ 1033 ☐ 1034 ☐ 1035 ☐ 1036 ☐ 1037 ☐ 1038 ☐ 1039 ☐ 1040 ☐ 1041 ☐ 1042 ☐ 1043 ☐ 1044 ☐ 1045 ☐ 1046 ☐ 1047 ☐ 1048 ☐ 1049 ☐ 1050 ☐ 1051 ☐ 1052 ☐ 1053 ☐ 1054 ☐ 1055 ☐ 1056 ☐ 1057 ☐ 1058 ☐ 1059 ☐ 1060 ☐ 1061 ☐ 1062 ☐ 1063 ☐ 1064 ☐ 1065 ☐ 1066 ☐ 1067 ☐ 1068 ☐ 1069 ☐ 1070 ☐ 1071 ☐ 1072 ☐ 1073 ☐ 1074 ☐ 1075 ☐ 1076 ☐ 1077 ☐ 1078 ☐ 1079 ☐ 1080 ☐ 1081 ☐ 1082 ☐ 1083 ☐ 1084 ☐ 1085 ☐ 1086 ☐ 1087 ☐ 1088 ☐ 1089 ☐ 1090 ☐ 1091 ☐ 1092 ☐ 1093 ☐ 1094 ☐ 1095 ☐ 1096 ☐ 1097 ☐ 1098 ☐ 1099 ☐ 1100 ☐ 1101 ☐ 1102 ☐ 1103 ☐ 1104 ☐ 1105 ☐ 1106 ☐ 1107 ☐ 1108 ☐ 1109 ☐ 1110 ☐ 1111 ☐ 1112 ☐ 1113 ☐ 1114 ☐ 1115 ☐ 1116 ☐ 1117 ☐ 1118 ☐ 1119 ☐ 1120 ☐ 1121 ☐ 1122 ☐ 1123 ☐ 1124 ☐ 1125 ☐ 1126 ☐ 1127 ☐ 1128 ☐ 1129 ☐ 1130 ☐ 1131 ☐ 1132 ☐ 1133 ☐ 1134 ☐ 1135 ☐ 1136 ☐ 1137 ☐ 1138 ☐ 1139 ☐ 1140 ☐ 1141 ☐ 1142 ☐ 1143 ☐ 1144 ☐ 1145 ☐ 1146 ☐ 1147 ☐ 1148 ☐ 1149 ☐ 1150 ☐ 1151 ☐ 1152 ☐ 1153 ☐ 1154 ☐ 1155 ☐ 1156 ☐ 1157 ☐ 1158 ☐ 1159 ☐ 1160 ☐ 1161 ☐ 1162 ☐ 1163 ☐ 1164 ☐ 1165 ☐ 1166 ☐ 1167 ☐ 1168 ☐ 1169 ☐ 1170 ☐ 1171 ☐ 1172 ☐ 1173 ☐ 1174 ☐ 1175 ☐ 1176 ☐ 1177 ☐ 1178 <

IOWA CITY AREA TRANSPORTATION STUDY----TRANSIT USER SURVEY

The Institute of Urban and Regional Research at the University of Iowa is performing this study to assess transit needs for the Johnson County Regional Planning Commission. Your cooperation is appreciated.

Please CHECK or CIRCLE the appropriate response for each question
Return this form to the checker when leaving the bus

Between what hours did you board this bus	HOUR	AM						PM						12 11			
		6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6		6 to 7		
		06	07	08	09	10	11	12	13	14	15	16	17		18		
How far, to the nearest block, did you travel before boarding this bus?	One	Two	Three	Four	Five	Six	More than six										
Was an automobile available for your use at the time you made this trip?	Yes	No															
What is your auto driving status?	Licensed and able to drive	presently unable to drive															
Which of the following best describes the main purpose of your trip?	Work	School	Shopping	Other													
How far, to the nearest block, will you travel after leaving this bus?	One	Two	Three	Four	Five	Six	More than six										
What is your age group?	0-17	18-22	23-35	36-64	65 or over												
How many automobiles are owned by you and/or by other members of your household?	None	One	Two	Three or More													
What is your income category?	Under \$5,000	\$5,000-\$10,000	Over \$10,000														
How many persons are in your household, including yourself.	1-2	3-4	5-6	7+													
Please describe yourself	Female	Male															

FIGURE A3
ON-BUS SURVEY³

UNIVERSITY HEIGHTS				03	CC 1 - 2
Inbound		Outbound			
	1		2	3	
					4-7 on 8-11 off
ON		OFF	ON		OFF
25-16	IOWA AVENUE			MELROSE AVENUE	
	Clinton	25-16	13-13	MacBride Road	13-13
25-16	N. Dubuque	25-16	14-13	Westgate Street	14-13
			14-13	Emerald Street	14-13
	N. DUBUQUE		16-13	Sunset Street	16-13
25-15	Washington	25-15	18-14	Olive Court	18-14
			19-14	Stadium Park Road	19-14
	WASHINGTON				
25-15	Clinton	25-15		WOOLF AVENUE	
			19-14	Melrose Avenue	19-14
	S. CAPITOL				
24-15	Washington	24-15		FIELD HOUSE ROAD	
24-15	College	24-15	19-15	Woolf Avenue	19-15
24-14	Burlington	24-14	20-15	U. Hosp. Pkg. Ramp	20-15
			21-15	S. Grand Avenue	21-15
	BURLINGTON STREET				
24-14	Madison	24-14		GRAND AVENUE	
22-14	Riverside Drive	22-14	21-14	S. Grand Avenue	21-14
			21-14	Byington Road	21-14
	GRAND AVENUE				
22-14	Byington Road	22-14		BURLINGTON STREET	
21-14	S. Grand Avenue	21-14	22-14	Riverside Drive	22-14
			21-14	Madison	23-14
	FIELD HOUSE ROAD		24-14	S. Capitol	24-14
21-15	S. Grand Avenue	21-15			
20-15	U. Hosp. Pkg. Ramp	20-15		CLINTON STREET	
19-15	Woolf Avenue	19-15	25-14	Burlington Street	25-14
			25-15	College Street	25-15
	WOOLF AVENUE		25-15	Washington Street	25-15
19-14	Melrose Avenue	19-14			
	MELROSE AVENUE				
19-14	Stadium Park Road	19-14			
18-14	Golfview Avenue	18-14			
16-13	Sunset Street	16-13			
14-13	Emerald Street	14-13			
14-13	Westgate Street	14-13			
13-13	MacBride Road	13-13			
11-17	HAWKEYE COURT	11-17			
10-14	HAWKEYE DRIVE	10-14			

FIGURE A3 (CONTINUED)

ON-BUS SURVEY: BOARDING AND DEPARTING LOCATIONS³

A. Have you been interviewed before? yes ☐ no ☐
(If yes, complete only questions 1,2,3, and 4.)

1. What is the purpose of this trip?
work ☐ school ☐ social/recreational ☐ shopping ☐ other ☐

2. Have you transferred to this bus from another bus? yes ☐ no ☐

3. Will you transfer to another bus before you finish this trip?
yes ☐ no ☐

4. What is your final destination? _____

5. Are you: employed full time ☐ retired ☐ housewife ☐
employed part time ☐ elementary or high school student ☐
Purdue student ☐ other _____

6. How many trips a week do you make for the following purposes?
work ☐ school ☐ social/recreational ☐ shopping ☐ other ☐

7. How did you reach the bus stop where you began this trip?
walked ☐ drove and parked ☐ rode as a passenger in a car ☐ other ☐

8. How far did you travel to get to the bus stop?
blocks ☐ miles ☐

9. Where will you get off the bus when you complete this trip?
_____ nearest street intersection

10. How far will you travel after you get off the bus?
blocks ☐ miles ☐

11. How will you get to your destination after you get off the bus?
walk ☐ drive ☐ ride as a passenger in a car ☐ other ☐

12. Was a car available for your use on this trip? yes ☐ no ☐

13. Do you have a driver's license? yes ☐ no ☐

14. How many cars are owned by you and others now living in your household?
none ☐ one ☐ two ☐ more than three ☐

15. What is your sex? male ☐ female ☐

16. What is your age bracket? 0-9 ☐ 10-19 ☐ 20-29 ☐ 30-44 ☐ 45-64 ☐ over 65 ☐

ON-BUS SURVEY GREATER LAFAYETTE AREA BUS STUDY⁴

Appendix B

This appendix contains an example of the coding procedure used in the Lafayette study. This is only one of a number of methods that can be used to code data for tabulation and analysis.

EXPLANATION OF CODING KEY

Punch Card Columns	Function or Question Being Coded	Coded Answers
1-4	Form Number	Four digits
5	Used for duplicates and children	One digit
6	Used for numbering cards (there were three cards used in order to record all the data from the on-board questionnaire along with the data from the mail-in questionnaire)	One digit (1,2, or 3)
7-9	Time of boarding	Recorded in tenths of an hour on a 24 hour basis
10	Blank	
11-13	Zone number (see Figure B2)	Three digits
14-16	Sub-zone	Three digits
17	Question A	1 or 2
18	Question 1	1,2,3,4, or 5
19	Question 2	1 or 2
20	Question 3	1 or 2
21-23	Zone number, question 4	Three digits
24-26	Sub-zone, Question 4	Three digits
27	Question 5	1,2,3,4,5,6, or 7
28-37	Question 6	Two digits for each purpose
38	Question 7	1,2,3, or 4
39-42	Question 8	Two digits for each answer
43-45	Zone number, Question 9	Three digits
46-48	Sub-zone, question 9	Three digits
49-52	Question 10	Two digits for each answer
53	Question 11	1,2,3, or 4
54	Question 12	1 or 2
55	Question 13	1 or 2
56	Question 14	1,2,3,4, or 5
57	Question 15	1 or 2
58	Question 16	1,2,3,4,5, or 6

point of boarding

ZONE \leftarrow SUB ZONE
 11 12 13 14 15 16

time of boarding

H IN TENTHS OF HOUR,
 24 HR BASIS
 7 8 9

Form #

DUPLICATES
 FORM # CARD #
 1 2 3 4 5 6

Dear Bus User: Your answers to these questions will help to decide the future of the Lafayette bus system. Your cooperation is appreciated.
 Please return this form when you leave the bus.

- ☐ 17 A. Have you been interviewed before? yes 1 no 2
 (If yes, complete only questions 1, 2, 3, and 4.)
- ☐ 18 1. What is the purpose of this trip?
 work 1 school 2 social/recreational 3 shopping 4 other 5
- ☐ 19 2. Have you transferred to this bus from another bus? yes 1 no 2
- ☐ 20 3. Will you transfer to another bus before you finish this trip?
 yes 1 no 2
- ☐ 21 4. What is your final destination? ZONE \leftarrow SUB ZONE
 11 12 13 14 15 16
- ☐ 22 5. Are you: employed full time 1 retired 4 housewife 3
 employed part time 2 elementary or high school student 6
 Purdue student 3 other 7
- ☐ 23 6. How many trips a week do you make for the following purposes?
 work 34 school 34 social/recreational 34 shopping 34 other 34
- ☐ 24 7. How did you reach the bus stop where you began this trip?
 walked 1 drove and parked 2 rode as a passenger in a car 3 other 4
- ☐ 25 8. How far did you travel to get to the bus stop?
 blocks 34 miles 34
- ☐ 26 9. Where will you get off the bus when you complete this trip?
 ZONE \leftarrow SUB ZONE
 11 12 13 14 15 16 nearest street intersection
- ☐ 27 10. How far will you travel after you get off the bus?
 blocks 34 miles 34
- ☐ 28 11. How will you get to your destination after you get off the bus?
 walk 1 drive 2 ride as a passenger in a car 3 other 4
- ☐ 29 12. Was a car available for your use on this trip? yes 1 no 2
- ☐ 30 13. Do you have a driver's license? yes 1 no 2
- ☐ 31 14. How many cars are owned by you and others now living in your household?
 none 1 one 2 two 3 three 4 more than three 5
- ☐ 32 15. What is your sex? male 1 female 2
- ☐ 33 16. What is your age bracket? 0-9 1 10-19 2 20-29 3 30-44 4 45-64 5 over 65 6

FIGURE B1
 CODING KEY⁶

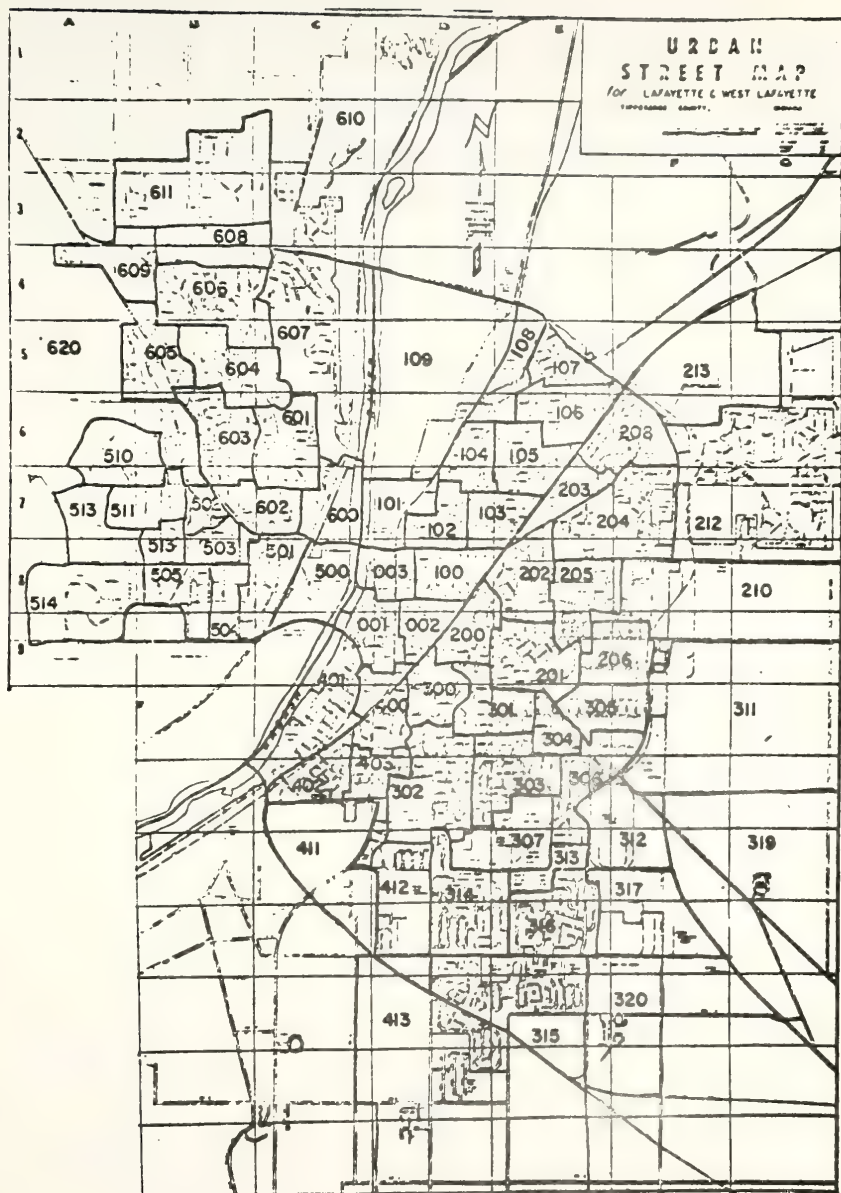


FIGURE B2
TRAFFIC ZONE MAP 7

Appendix C

Provided in this appendix is a mail-in questionnaire for transit riders that was used in the Lafayette study.⁸ The questionnaire was distributed on-board the transit vehicles during the origin-destination survey.

No. _____

LAFAYETTE BUS STUDY

Dear Bus User, the information you furnish by answering the following questions will be used to determine the future of the bus system. Completion and return in the furnished, stamped, addressed envelope today is extremely important.

1. Rank the following items in order of their importance to you. (Rank the most important number 1, the second important number 2, etc.)
 - _____ Public Housing
 - _____ Public Schools
 - _____ Pollution Control
 - _____ Police Protection
 - _____ Welfare
 - _____ Public Bus System
 - _____ Downtown Railroad Crossing
 - _____ Streets and Roads
 - _____ Public Parks
2. Place an X next to your reason(s) for riding the bus (you may choose more than one)
 - _____ Do not like to drive
 - _____ Bus more convenient than auto
 - _____ No drivers license
 - _____ Family does not own car
 - _____ Bus less expensive than auto
 - _____ Parking not available at destination
 - _____ Auto used by another family member
 - _____ Other
3. On the bus trip where you received this questionnaire, what would have been a more convenient time for you to get on the bus?

_____ A.M. _____ P.M.
4. On the same trip, what would have been a more convenient place, if any, for you to get on the bus?

_____ nearest street intersection
5. On the same trip, what would have been a more convenient place, if any, for you to get off the bus?

_____ nearest street intersection
6. On the same trip, what time did you want to get to your destination? (nearest 15 min.)

_____ A.M. _____ P.M.

7. Assume that you are making a trip by yourself on the bus within the Lafayette-West Lafayette area. Write, in the space below, what you think would be an acceptable fare for the one-way trip, if the bus picked you up within 4 blocks of your home.

_____ Each Way

8. Assume that you could have the bus pick you up in front of your home rather than the regular bus stop nearest your home. Write in the space below what you think would be an acceptable charge for the one way trip.

_____ Each Way

9. Indicate below your opinion about who should operate the bus system in the Lafayette-West Lafayette area. Assume that the same fares would be charged no matter who operates the service.

_____ Lafayette-West Lafayette and County
 _____ Lafayette-West Lafayette
 _____ Private Bus Company

10. The following statements concern the financial operation of a bus service. Indicate your preferences.

Bus Service should pay for itself from fares charged users.

Yes _____ No _____ No Opinion _____

Bus Service should be supported in part by fares and in part by local taxes.

Yes _____ No _____ No Opinion _____

Bus Service should be free with entire cost paid from local taxes.

Yes _____ No _____ No Opinion _____

11. For regularly employed bus riders: would you consider purchasing a service that picked you up at home, took you to work and returned you to your home at the end of the day. Yes _____ No _____
 If no, go to question No. 12.
 If yes, continue.

- a) Where do you work?

_____ (name of store, company or address)

- b) When do you start work? _____ A.M. _____ P.M.

- c) When do you finish work? _____ A.M. _____ P.M.

- d) How long a riding time would be satisfactory? _____ minutes

- e) How much would you be willing to pay for each one way trip?
 (check one)

_____ 10¢
 _____ 20¢
 _____ 30¢

_____ 40¢
 _____ 50¢
 _____ 60¢

12. Education (check one)

☐ 0-8 years of grade school
☐ 2 years of high school
☐ high school graduate
☐ 2 years of college
☐ college graduate
☐ advanced degree

13. Assuming you were to use an improved bus system for transportation, circle the number which shows how important it would be to you to have bus service to the place named. For example, if you feel it is unimportant for you to have bus service to the place named, circle the number 1. If on the other hand, you feel it is important to you, circle the number 7. If you do not have strong feelings one way or the other, circle one of the numbers between 1 and 7 to show how you feel.

DOWNTOWN LAFAYETTE

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

K-MART, TOPPS

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

PURDUE UNIVERSITY

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

MARKET SQUARE

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

ALCOA - NATIONAL HOMES

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

PURDUE RESEARCH PARK

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

ELI LILLY

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

COLUMBIAN PARK

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

HOSPITALS (St. Elizabeth-Home)

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

YMCA-TIPTECANOE FAIRGROUNDS

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

SEARS-SHOPPERS FAIR

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

WEST LAFAYETTE BYPASS SHOPPING AREAS (Wabash Village)

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

TEAL ROAD SHOPPING CENTERS (Jefferson Square - Lafayette Square)

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

DUNCAN ELECTRIC

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

GENERAL FOODS

	1	2	3	4	5	6	7	
Unimportant	<hr/>							Very important

List any other places in the Lafayette - West Lafayette area to which you would desire bus service.

14. For the following statements concerning the present Bus Service indicate your feelings by checking the appropriate answer.

It is easy to find out which bus to take

Yes ____ No ____ No Opinion ____

There are enough shelters at the stops

Yes ____ No ____ No Opinion ____

Bus stops are adequately marked

Yes ____ No ____ No Opinion ____

It is not much trouble to transfer

Yes ____ No ____ No Opinion ____

Bus schedules are easy to find

Yes ____ No ____ No Opinion ____

The bus hardly ever breaks down

Yes ____ No ____ No Opinion ____

The insides of buses are clean, neat, and in good repair

Yes ____ No ____ No Opinion ____

Buses are usually on schedule

Yes ____ No ____ No Opinion ____

Buses are comfortable and pleasant to ride

Yes ____ No ____ No Opinion ____

Buses make too many stops along the routes

Yes ____ No ____ No Opinion ____

Bus drivers are neat in appearance

Yes ____ No ____ No Opinion ____

Bus drivers are often helpful and courteous

Yes ____ No ____ No Opinion ____

Buses go where I need to go

Yes ____ No ____ No Opinion ____

Other general comments concerning the bus system _____

15. Each set below contains two items, A and B. Select the way which you would prefer to pay for your bus trips. Show your selection by circling the letter A or B. Circle an A or B for each pair. (Each pair appears only once.)

A. Cash

B. Tokens

A. Credit Card

B. Monthly billing

A. Tokens

B. Credit Card

A. Credit Card

B. Cash

A. Monthly billing

B. Tokens

A. Cash

B. Monthly billing

Other, describe _____

Thank you for your cooperation and assistance.

Appendix D

Contained in this appendix are a number of reports dealing with the types of census data available and the procedures for obtaining the data. The reports are listed below in the order in which they appear.

1. 1970 Census Summary Tape User Memorandum No. 30
(Revised)⁹
2. First Count Summary Tapes from the 1970 Census
of Population and Housing¹⁰
3. Summary Tape Processing Centers¹¹



U.S. DEPARTMENT OF COMMERCE
Bureau of Economic Statistics Administration
BUREAU OF THE CENSUS
OFFICE OF THE DIRECTOR

February 28, 1972

1970 Census Summary Tape User Memorandum No. 30 (Revised)

SUBJECT: 1970 Census First Count Summary Data on Microfilm

Microfilm of the contents of the 1970 Census First Count Summary Tapes is available for each State, the District of Columbia, and Puerto Rico. The microfilm version of the First Count was prepared because of the interest in small-area data which are not found in printed reports, including data for block groups and enumeration districts. Providing the information on microfilm, as well as on computer tapes, facilitates access to the data for redistricting and other uses. Paper copies of microfilm images, as shown on page 3, may also be obtained.

The microfilm was prepared directly from the First Count tapes. A machine, the S-C 4411, "reads" a summary tape containing specific formatting instructions and arranged the tape's contents for photographing. To minimize the amount of film and programming required, the microfilm frames are essentially an array of numbers organized into lines and columns, as illustrated on page 3. Each frame presents the First Count data for one particular geographic area, such as an enumeration district (ED), block group (BG), or county.

There is no descriptive text found on the microfilm itself. Purchasers are furnished documentation similar to that used with the summary tapes. The documentation contains a listing of the tabulated items (referred to as a matrix) accompanied by the line and column location of various items.

Coded geographic identification appears at the top of each frame. The abbreviations used are interpreted on page 4. However, to interpret the matrix codes, users need to consult the 1970 Census Enumeration District List (MEDLIST), the Geographic Area Code Index (GACI) which carries the name and assigned codes for the political and statistical subdivisions of States. For information on MEDLIST and GACI, see Summary Tape User Memorandum No. 29 (Revised) and No. 20A. General Reference Tapes are also needed in order to determine the boundaries of ED's, BG's, and tracts. See Summary Tape User Memorandum No. 27 and Data Access Description No. 12.

Advantages of the Microfilm — It offers the entire contents of the First Count summary tapes but does not require a programmer or computer to be read. No printed report will be issued which will contain all the information found on the microfilm and tapes.

Secondly, there is a cost advantage in comparison to data on census summary tapes. For example, First Count data for California requires 19 rolls of microfilm for a total cost of \$152 (Eight reels of computer tape are necessary for a total cost of \$480 (at \$60 per reel)).

Thirdly, if a reader-printer is available, a photocopy of any frame can be made at about the cost of a regular Xerox copy. Finally, microfilm is a more easily stored and managed source of information.

Disadvantages of the Microfilm — Use of the microfilm may be tedious because of the necessity to identify and locate a specific geographic unit by hand. In addition, documentation will have to be referred to in order to locate the desired data on the microfilm frames. To determine the location of any data cell of interest for the ED reported in the attached illustration, it is necessary to know the field number (column identifier) and matrix number (row identifier). For example, number of males under 5 years is found in field 1, matrix 18; "10" males under 5, Line 1) of matrix 18; "9" males age 19, Line 1) of matrix 18; "9" males age 19.

Information and Orders — The cost is \$9 per roll of 16mm microfilm, with from one to 19 rolls per State. The number of rolls of microfilm required for File A and File B of the First Count for each State is listed on page 5. Orders for microfilm should be directed to the Users' Service Staff. The Users' Service Staff should also be contacted for information on cost and arrangements for obtaining paper copies of microfilm images for selected area

GEOGRAPHIC HEADER ABBREVIATIONS

ABREVIATION	Line 1	Line 2	EXPLANATION
B	T		Record Type*
70	S*		1970 State Code
70	T		1970 County Code of Enumeration
80	S*		1960 State Code
80	T		1960 County Code
CU	S*		County State Code
COD			Minor Civil Division Census Civil Division (When codes are applicable)
A	N		Annotation Place Code
W	D		Ward
TRAC			Tract Code (basic and suffix)
DO			District Office
CD			Congressional District
C	d		Central Business District
E			Enumeration District (basic and suffix)
POT	E		Potential Urbanized Area
UA			Type of Enumeration District:
C			Standard Urbanized Area
SKSA			Standard Metropolitan Statistical Area
U	R		Urban/Rural Code
ACT	UA		Actual Urbanized Area
S	R		State Economic Area
TA			Tracted Area
P	D		Place Description
O	B		Specified City With Rural Territory
RSR			Economic Sub-Region
TAB	OU		1970 County of Tabulation
PS			New England Town Site Code
PLCE	V		New England Town Code
L			Universal Area Code-Level
COUS			Universal Area Code
PL	SZ		Place Size
P	C		Publication Code
G			Block Group Code

Record Type Codes are:

- 0 = State
1 = County
2 = Minor Civil Division (MCD)
3 = Minor Civil Division (MCD) Place Segment
4 = Place
5 = Congressional District
7 = Enumeration District
8 = Block Group
Code 6 is not used.

Format for Microfilm Frames of 1970 Census First Count Summary Tapes.

1990 FIRST COUNT CLARE		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		2029		2030		2031		2032		2033		2034		2035		2036		2037		2038		2039		2040		2041		2042		2043		2044		2045		2046		2047		2048		2049		2050		2051		2052		2053		2054		2055		2056		2057		2058		2059		2060		2061		2062		2063		2064		2065		2066		2067		2068		2069		2070		2071		2072		2073		2074		2075		2076		2077		2078		2079		2080		2081		2082		2083		2084		2085		2086		2087		2088		2089		2090		2091		2092		2093		2094		2095		2096		2097		2098		2099		2100		2101		2102		2103		2104		2105		2106		2107		2108		2109		2110		2111		2112		2113		2114		2115		2116		2117		2118		2119		2120		2121		2122		2123		2124		2125		2126		2127		2128		2129		2130		2131		2132		2133		2134		2135		2136		2137		2138		2139		2140		2141		2142		2143		2144		2145		2146		2147		2148		2149		2150		2151		2152		2153		2154		2155		2156		2157		2158		2159		2160		2161		2162		2163		2164		2165		2166		2167		2168		2169		2170		2171		2172		2173		2174		2175		2176		2177		2178		2179		2180		2181		2182		2183		2184		2185		2186		2187		2188		2189		2190		2191		2192		2193		2194		2195		2196		2197		2198		2199		2200		2201		2202		2203		2204		2205		2206		2207		2208		2209		2210		2211		2212		2213		2214		2215		2216		2217		2218		2219		2220		2221		2222		2223		2224		2225		2226		2227		2228		2229		2230		2231		2232		2233		2234		2235		2236		2237		2238		2239		2240		2241		2242		2243		2244		2245		2246		2247		2248		2249		2250		2251		2252		2253		2254		2255		2256		2257		2258		2259		2260		2261		2262		2263		2264		2265		2266		2267		2268		2269		2270		2271		2272		2273		2274		2275		2276		2277		2278		2279		2280		2281		2282		2283		2284		2285		2286		2287		2288		2289		2290		2291		2292		2293		2294		2295		2296		2297		2298		2299		2300		2301		2302		2303		2304		2305		2306		2307		2308		2309		2310		2311		2312		2313		2314		2315		2316		2317		2318		2319		2320		2321		2322		2323		2324		2325		2326		2327		2328		2329		2330		2331		2332		2333		2334		2335		2336		2337		2338		2339		2340		2341		2342		2343		2344		2345		2346		2347		2348		2349		2350		2351		2352		2353		2354		2355		2356		2357		2358		2359		2360		2361		2362		2363		2364		2365		2366		2367		2368		2369		2370		2371		2372		2373		2374		2375		2376		2377		2378		2379		2380		2381		2382		2383		2384		2385		2386		2387		2388		2389		2390		2391		2392		2393		2394		2395		2396		2397		2398		2399		2400		2401		2402		2403		2404		2405		2406		2407		2408		2409		2410		2411		2412		2413		2414		2415		2416		2417		2418		2419		2420		2421		2422		2423		2424		2425		2426		2427		2428		2429		2430		2431		2432		2433		2434		2435		2436		2437		2438		2439		2440		2441		2442		2443		2444		2445		2446		2447		2448		2449		2450		2451		2452		2453		2454		2455		2456		2457		2458		2459		2460		2461		2462		2463		2464		2465		2466		2467		2468		2469		2470		2471		2472		2473		2474		2475		2476		2477		2478		2479		2480		2481		2482		2483		2484		2485		2486		2487		2488		2489		2490		2491		2492		2493		2494		2495		2496		2497		2498		2499		2500		2501		2502		2503		2504		2505		2506		2507		2508		2509		2510		2511		2512		2513		2514		2515		2516		2517		2518		2519		2520		2521		2522		2523		2524		2525		2526		2527		2528		2529		2530		2531		2532		2533		2534		2535		2536		2537		2538		2539		2540		2541		2542		2543		2544		2545		2546		2547		2548		2549		2550		2551		2552		2553		2554		2555		2556		2557		2558		2559		2560		2561		2562		2563		2564		2565		2566		2567		2568		2569		2570		2571		2572		2573		2574		2575		2576		2577		2578		2579		2580		2581		2582		2583		2584		2585		2586		2587		2588		2589		2590		2591		2592		2593		2594		2595		2596		2597		2598		2599		2600		2601		2602		2603		2604		2605		2606		2607		2608		2609		2610		2611		2612		2613		2614		2615		2616		2617		2618		2619		2620		2621		2622		2623		2624		2625		2626		2627		2628		2629		2630		2631		2632		2633		2634		2635		2636		2637		2638		2639		2640		2641		2642		2643		2644		2645		2646		2647		2648		2649		2650		2651		2652		2653		2654		2655		2656		2657		2658		2659		2660		2661		2662		2663		2664		2665		2666		2667		2668		2669		2670		2671		2672		2673		2674		2675		2676		2677		2678		2679		2680		2681		2682		2683		2684		2685		2686		2687		2688		2689		2690		2691		2692		2693		2694		2695		2696		2697		2698		2699		2700		2701		2702		2703		2704		2705		2706		2707		2708		2709		2710		2711		2712		2713		2714		2715		2716		2717		2718		2719		2720		2721		2722		2723		2724		2725		2726		2727		2728		2729		2730		2731		2732		2733		2734		2735		2736		2737		2738		2739		2740		2741		2742		2743		2744		2745		2746		2747		2748		2749		2750		2751		2752		2753		2754		2755		2756		2757		2758		2759		2760		2761		2762		2763		2764		2765		2766		2767		2768		2769		2770		2771		2772		2773		2774		2775		2776		2777		2778		2779		2780		2781		2782		2783		2784		2785		2786		2787		2788		2789		2790		2791		2792		2793		2794		2795		2796		2797		2798		2799		2800		2801		2802		2803		2804		2805		2806		2807		2808		2809		2810		2811		2812		2813		2814		2815		2816		2817		2818		2819		2820		2821		2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* The data presented here are for an enumeration district (#44) within a census tract (#106).

FIRST GOVT MICROFILM

State	Number of Rolls		State	Number of Rolls	
	File A*	File B*		File A	File B
Alabama.....	4	1	Montana.....	1	1
Alaska.....	1	1	Nebraska.....	2	2
Arizona.....	2	1	Nevada.....	1	1
Arkansas.....	3	2	New Hampshire.....	1	1
California.....	19	2	New Jersey.....	5	1
Colorado.....	3	1	New Mexico.....	14	1
Connecticut.....	3	1	New York.....	14	3
Delaware.....	1	1	North Carolina.....	5	2
District of Columbia.....	4	2	North Dakota.....	1	1
Florida.....	7	1	Ohio.....	10	3
Georgia.....	4	2	Oklahoma.....	3	2
Hawaii.....	1	1	Oregon.....	3	1
Idaho.....	1	1	Pennsylvania.....	10	4
Illinois.....	12	4	Rhode Island.....	1	1
Indiana.....	5	2	South Carolina.....	3	1
Iowa.....	4	3	South Dakota.....	1	1
Kansas.....	4	3	Tennessee.....	4	1
Kentucky.....	3	2	Texas.....	11	3
Louisiana.....	4	1	Utah.....	2	1
Maine.....	4	1	Vermont.....	1	1
Maryland.....	1	1	Virginia.....	4	1
Massachusetts.....	4	1	Washington.....	4	1
Michigan.....	8	3	West Virginia.....	2	1
Minnesota.....	5	4	Wisconsin.....	5	3
Mississippi.....	2	1	Wyoming.....	1	1
Missouri.....	5	3	Puerto Rico.....	4	2

File A: data summaries for ED's and EC's. File B: data summaries for State, counties, MCD's or CDD's, MCD-places, places, congressional districts.

First Count Summary Tables

[illegible]

See footnotes at end of table.

First Count Count Summary Tapes-Continued

[illegible]

See footnotes at end of table.

First Count Summary Tapes--Continued

Index Line	Date examined	Index Line	Date examined
40.	Total facilities for occupied and vacant pre-war rental housing units.	40.	Court of occupied units with rooming, boarding, or lodgings.
41.	Plum toilet, but also used by another household.	41.	Occupied and vacant pre-war rental units with all plumbing facilities for which value is tabulated.
42.	Plum toilet, but also used by another household.	42.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
43.	Plum toilet, but also used by another household.	43.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
44.	Plum toilet, but also used by another household.	44.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
45.	Plum toilet, but also used by another household.	45.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
46.	Plum toilet, but also used by another household.	46.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
47.	Plum toilet, but also used by another household.	47.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
48.	Plum toilet, but also used by another household.	48.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
49.	Plum toilet, but also used by another household.	49.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
50.	Plum toilet, but also used by another household.	50.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
51.	Plum toilet, but also used by another household.	51.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
52.	Plum toilet, but also used by another household.	52.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
53.	Plum toilet, but also used by another household.	53.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
54.	Plum toilet, but also used by another household.	54.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
55.	Plum toilet, but also used by another household.	55.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
56.	Plum toilet, but also used by another household.	56.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
57.	Plum toilet, but also used by another household.	57.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
58.	Plum toilet, but also used by another household.	58.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
59.	Plum toilet, but also used by another household.	59.	Value of non-occupied units with all plumbing facilities for which value is tabulated.
60.	Plum toilet, but also used by another household.	60.	Value of non-occupied units with all plumbing facilities for which value is tabulated.

See footnotes at end of table.

First Count Summary Tapes--Continued

[illegible]

The position is that of Lohg.

SUMMARY TAPE PROCESSING CENTERS

May 1972

Introduction

Since early 1969 the Bureau of the Census has recognized over 175 organizations (private, public, governmental, and academic), at their request, as Summary Tape Processing Centers. The Census Bureau recognizes those organizations and groups which file a statement with the Bureau indicating their intention to service the needs of census data users outside their organization and specifying their planned activities. These recognized organizations are listed in the Summary Tape Processing Centers Newsletter. The Census Bureau considers the public listings of Summary Tape Processing Centers as a useful means of calling attention to their programs and thereby encouraging the pooling of resources and avoiding possible duplications of effort and extra expense to census data users. The processing center address list, which begins on page 2, is part of this effort.

The centers are not franchised, established or supported by the Bureau of the Census. Data products are available to the centers on the same basis as to all other data users. Centers develop through local initiative and respond to needs recognized by their organizers. The forms which centers assume, their purposes, and the goals they strive to achieve are determined by the organizers of the centers. The mode of operation of each center is determined by the group organizing the center. The Bureau has no requirements. Each processing center establishes its own cost structure for services and may serve any interested client as it chooses.

Centers generally provide the following kinds of services.

1. Prepare summary tape copies for other users.
2. Provide an information exchange for users on subjects such as display programs, problems in tape use, and new applications of census data. This kind of exchange encourages more effective use of the data and helps to reduce duplication of effort.
3. Maintain general computer programs prepared by the Bureau or by others and offer the application of these programs to local users. These programs might be designed to accomplish the more simple and elementary uses of the tapes in such areas as data displays, aggregation of census data for areas not presented on the tapes, and calculation of derived measures commonly wanted.

4. Develop or purchase special computer programs and advise users of their availability. There is frequent need for such programs. For example, some centers provide for those involved in regional information systems, need to assist in the correlation of local data bases to the census data base for small areas.

Brief descriptions of the proposed activities of the Summary Tape Processing Centers and listings of the summary tape files each center anticipates maintaining will be presented in a booklet now being prepared, along with the address, phone number and name of the principal contacts. Previously, this information has been carried in issues of the Summary Tape User Memoranda to centers; however, the series is now out of date and will not be republished. The information available from the data bases and the laboratory. To obtain detailed information concerning these services, please write directly to the processing centers of interest to you.

Summary Tape Processing Center Address List

Alabama

Bureau of Research and Community Service
School of Community and Allied
University of Alabama
1915 Seventh Avenue, South
Birmingham, Alabama 35233

Center for Business and Economic Research
Graduate School of Business
University of Alabama at Birmingham
University, Alabama 35486
University Computer Center
University of South Alabama
Mobile, Alabama 36608

Alaska

City of Anchorage
Data Processing Division
P.O. Box 400
Anchorage, Alaska 99501

Institute of Social, Economic, and Government Research
University of Alaska
College, Alaska 99701

Arizona

Resource Consultants, Inc.
201 East Earl Drive
Phoenix, Arizona 85012

Western American Computing Corporation
2214 North Central Avenue
Phoenix, Arizona 85024

Arkansas

Industrial Research and Estimation Center
University of Arkansas
P.O. Box 9077
Little Rock, Arkansas 72203
California

Institute of Governmental Studies & the Survey Research Center
University of California
Berkeley, California 94720

Systems, Science and Software
P.O. Box 1620
La Jolla, California 92037

Public Systems Research Institute
University of Southern California
University Park
Los Angeles, California 90007

- Acquard Systems**
904 Manhattan Avenue
Suite 8
Manhasset Beach, California 90266
- Anders Pritch Research Center**
ALLSTATE Insurance Company
321 Middlefield Road
Menlo Park, California 94025
- Systems Exploration, Inc.**
9487 Wilshire Street
San Diego, California 92106
- Market Compilation and Research Bureau**
12011 Victory Boulevard
North Hollywood, California 91609
- Academic Census Data Center**
16532 Avenor Street
Pacific Palisades, California 90272
- Larry Smith and Company, Inc.**
One Maritime Place
San Francisco, California 94111
- David Drachell & Associates**
Pier 3, Embarcadero
San Francisco, California 94111
- Wilbur Smith & Associates, Inc.**
Western Region
311 Pine Street, Room 1500
San Francisco, California 94104
- Becker and Hayes, Inc.**
11661 San Vicente Blvd, Suite 907
Los Angeles, California 90045
- Decision Making Information**
Suite 800
Santa Ana, California 92705
- Barley/Hobbs Associates, Inc.**
17602 Irvine Boulevard
Tustin, California 92680
- Quantitized Analysis Centers, Inc.**
(C.A.C.I.)
12011 San Vicente Boulevard
Suite 350
Los Angeles, California 90049
- Environmental Systems Research Institute**
14 Fifth Street
Medlands, California 92373
- Speron, Inc.**
14760 Omarad Street
Van Nuys, California 91401
- Colorado**
- Business Research Division**
Graduate School of Business
Administration
University of Colorado
Boulder, Colorado 80502
- Scientific Software Corporation**
Education & Economic Systems Division
1123 Spruce Street
Boulder, Colorado 80302
- Bureau of Business and Public Research, School of Business**
University of Northern Colorado
Greeley, Colorado 80631
- Connecticut**
- AIWO-System**
Division of RMC Industries, Inc.
239 Service Road, West
Hartford, Connecticut 06101
- Managed Marketing**
P.O. Box 343
Bloom, Connecticut 06010
- Wilbur Smith and Associates, Inc.**
Northeastern Region
155 Whitney Avenue
New Haven, Connecticut 06510
- Social Science Data Center**
University of Connecticut
Storrs, Connecticut 06268
- District of Columbia**
- Census Data Corporation**
1710 N Street, N.W.
Washington, D.C. 20036
- Claritas Corporation**
Suite 204
3600 H Street, N.W.
Washington, D.C. 20007
- Computer Cartography, Inc.**
211 C Street, N.E.
Washington, D.C. 20002
- Applied Urbanistics, Inc.**
1101 17th Street, N.W.
Suite 1103
Washington, D.C. 20036
- Metropolitan Washington Council of Governments**
1225 Connecticut Ave., N.W.
Washington, D.C. 20036
- Boeing Computer Services, Inc.**
955 L'Enfant Plaza, North, S.W.
Third Floor
Washington, D.C. 20024
- Florida**
- The Center for Urban Studies**
University of Miami, P.O. Box 8002
Coral Gables, Florida 33124
- Census '70 Data Center**
7600 S.W. 57th Avenue
Miami, Florida 33143
- Housing Data-Bank Division**
Economic Data Bank, Inc.
7300 S.W. 62nd Avenue
Miami, Florida 33143
- Computing Center**
Florida State University
Tallahassee, Florida 32306
- Electronic Data Processing Division**
Department of General Services
State of Florida
Larson Building
Tallahassee, Florida 32304
- Strategy Research Corporation**
4100 N.W. 72nd Avenue
Miami, Florida 33166
- Georgia**
- Demographic Research and Training Center**
Social Science Research Institute
University of Georgia
Athens, Georgia 30601
- Urban Life Center**
Computer Center
Georgia State University
Atlanta, Georgia 30303
- Attitude Research Studies**
Georgia Institute of Technology
Atlanta, Georgia 30332
- Bureau of State Planning and Community Affairs**
270 Peachtree Street, S.W.
Atlanta, Georgia 30334
- Environmental Data Planning Associates**
1182 West Peachtree St., N.W.
Suite 306
Atlanta, Georgia 30309
- Hawaii**
- Information Systems Department**
City and County of Honolulu
Honolulu, Hawaii 96813
- Department of Budget & Finance**
Statewide Information Center
State of Hawaii
P.O. Box 150
Honolulu, Hawaii 96810
- Computech, Inc.**
Suite 205
700 Bishop Street
Honolulu, Hawaii 96812
- Idaho**
- State Auditors Office**
Data Processing Center
Capitol Building
Boise, Idaho 83702
- Illinois**
- Parsons-Archam Associates, Inc.**
1771 West Howard Street
Chicago, Illinois 60626

Audit Bureau of Circulations
123 North Dearborn Street
Chicago, Illinois 60606

Chicago Datacenter
Office of the Mayor
Room 6114, Civic Center
Chicago, Illinois 60602

CSIA Financial Services Corp.
Marketing Research Division
6801 East Oak Road
Berwyn, Illinois 60422

Northeast Illinois Planning
Commission
400 West Madison Street
Suite 2500
Chicago, Illinois 60606

Sociology-Anthropology Dept.
College of Arts and Sciences
Illinois State University
Normal, Illinois 61761

Dayt, Incorporated
9333 Linder Avenue
Skokie, Illinois 60077

Illinois Data Center
Department of Finance
Management Information Division
State of Illinois
604 State Office Building
Springfield, Illinois 62706

Indiana
Data Indexing Systems Corporation
924 West 17th Street
Bloomington, Indiana 47401

Research Associates, Inc.
P.O. Box 44640
Indianapolis, Indiana 46244

Iowa
Evaluation, Systems, and
Planning, Inc.
321 Shops Building
Des Moines, Iowa 50311

Iowa State University
Department of Sociology and
Anthropology
101 Clinton Hall
Ames, Iowa 50010

Institute of Urban and Regional
Research
University of Iowa
102 Church Street
Iowa City, Iowa 52240

Kansas
Institute for Social and
Environmental Studies
University of Kansas
Lawrence, Kansas 66044

Center for Business and Economic
Research
337 Clinton Hall
Wichita State University
Wichita, Kansas 67202

Boeing Computer Services, Inc.
Switzer Place Building
Wichita, Kansas 67202

Kentucky
Falls of the Ohio Metropolitan
Council of Governments, Inc.
902 Fiscal Court Building
Louisville, Kentucky 40202

Louisiana
Louisiana Tech University
Division of Business and Economic
Research
Ruston, Louisiana 71270

Centape Division
Martin J. Associates, Inc.
630 North Street
Baton Rouge, Louisiana 70802

Bureau of Business Research
College of Business Administration
Northeast Louisiana University
Monroe, Louisiana 71201

Concord Research Corporation
12 New England Executive Park
Burlington, Massachusetts 01803

Michigan
Northeast Michigan Regional
Planning & Development Comm.
216 South Third Street
Bogert City, Michigan 49775

Market Opinion Research
327 John R. Street
Detroit, Michigan 48226

Inter-University Consortium for
Political Research
P.O. Box 1248
Ann Arbor, Michigan 48106

Southeast Michigan Council of
Governments
Office of Data Systems
810 Book Building
Detroit, Michigan 48226

Tri-County Regional Planning
Commission
535 North Clippert Street
Lansing, Michigan 48912

Marketing Information Systems
1945 Pauline Boulevard
Ann Arbor, Michigan 48103

Oakland County Planning Commission
1200 North Telegraph Road
Pontiac, Michigan 48333

Minnesota
Central Data Corporation
CITYVIEW
4550 West 77th Street
P.O. Box 0
Minneapolis, Minnesota 55403

Data Industries, Inc.
300
3525 North Causeway Blvd.
Metairie, Louisiana 70002

Maine
Public Affairs Research
Center of Bowdoin College
Brunswick, Maine 04011

Maryland
Ed Nichols Associates
10400 Cornerfield Avenue
Kensington, Maryland 20795

System Sciences, Inc.
4720 Montgomery Lane
Bethesda, Maryland 20014

World Systems Laboratories, Inc.
7979 Old Georgetown Road
Bethesda, Maryland 20014

DATA Services Division
Westat Research, Inc.
11600 Nobel Street
Rockville, Maryland 20852

Massachusetts
Urban Data Processing, Inc.
675 Massachusetts Avenue
Cambridge, Massachusetts 02139

Stop & Shop, Inc.
39710 Street
Boston, Massachusetts 02210

Worcester Census Services, Inc.
90 Madison Street
Worcester, Massachusetts 01608

Laboratory for Computer Graphics
and Spatial Analysis
Harvard University
Memorial Hall 114
Cambridge, Massachusetts 02138

- Minnesota Analysis & Planning System**
Agriculture Extension Service
University of Minnesota
302 Coffey Hall
St. Paul, Minnesota 55101
- Intech, Inc.**
2915 Weyzata Boulevard
Minneapolis, Minnesota 55378
- Mississippi**
Department of Sociology and Anthropology
Mississippi State University
P.O. Drawer 600
State College, Mississippi 39762
- Missouri**
East-West Gateway Coordinating Council
Comptroller Center, University of Missouri
8001 Natural Bridge Road
St. Louis, Missouri 63121
- Demographic Data Service**
University of Missouri-Columbia
104 Sociology Building
Columbia, Missouri 65201
- St. Louis Regional Industrial Development Corporation**
Pierre Laclede Building
7733 Forsyth Blvd., Rm. 700
St. Louis, Missouri 63105
- Administrative Services Section**
Division of Budget and Finance
Comptroller's Office, Rm. B-10
Capitol Building
Jefferson City, Missouri 65101
- Information Systems Development, Inc.**
3430 Broadway
Kansas City, Missouri 64111
- Metropolitan Planning Commission**
Kansas City Region
127 West 10th Street, Suite 366
Kansas City, Missouri 64105
- Montana**
State Information System
Department of Planning and Economic Development
Capitol Post Office
Helena, Montana 59601
- Nebraska**
Missouri Valley Planning Information Center
University of Nebraska
Box 222, Nebraska Hall
Lincoln, Nebraska 68508
- Nevada**
Central Data Processing Division
Department of Administration
State of Nevada
Carson City, Nevada 89701
- New Hampshire**
New England Regional Center for Health & Demographic Statistics
New England Center for Continuing Education
Durham, New Hampshire 03824
- New Jersey**
Automated Marketing, Inc.
2400 Lincoln Avenue
Fort Lee, New Jersey 07024
- Princeton-Rutgers Census Data Project**
Princeton University Computer Center
87 Prospect Avenue
Princeton, New Jersey 08540
- New Mexico**
Bureau of Business Research
Institute for Social Research and Development
The University of New Mexico
Albuquerque, New Mexico 87106
- New York**
Social & Preventive Medicine Department (CHP)
State University of New York
2211 Main Street
Buffalo, New York 14214
- Consolidated Analysis Centers, Inc. (C.A.C.I.)**
2 West 45th Street
New York, New York 10036
- Keystone Computer Associates, Inc.**
New York Office
1700 Broadway
New York, New York 10019
- Tri-State Transportation Commission**
100 Church Street
New York, New York 10007
- National Planning Data Corporation**
P.O. Box 610
20 Terrace Hall
Ithaca, New York 14850
- New York State Department of Commerce**
112 State Street
Albany, New York 12205
- AMC Automated Management Information Concepts, Inc.**
Quaker Building
420 Lexington Avenue
New York, New York 10017
- Computer Task Group, Inc.**
5586 Main Street
Buffalo, New York 14221
- McGraw-Hill Planning Consultants**
Idip MacArthur Airport
Bohemia, New York 11716
- Datamation Services, Inc.**
461 Eighth Avenue
New York, New York 10001
- S.T. Brightbill and Associates, Inc.**
25 South Street
Bessie 112
Marcellus, New York 13108
- Infomark Corporation**
100 West 45th Street
New York, New York 10017
- Computer Graphics, Inc.**
1941 Wadsworth Avenue
Wentz, New York 11793
- Genesee Computer Center, Inc.**
20 University Avenue
Rochester, New York 14605
- North Carolina**
Institute for Research in Social Science/UNC Computation Center
University of North Carolina at Chapel Hill
Chapel Hill, North Carolina 27514
- Systems Management Division**
North Carolina Department of Administration
116 West Jones Street
Raleigh, North Carolina 27603
- System Sciences, Inc.**
Two Willow Terrace, Box 2345
Chapel Hill, North Carolina 27514
- Ohio**
Northeast Ohio Areawide Coordinating Agency
489 The Arcade
Cleveland, Ohio 44114

Institute for Urban Information
Systems, University of Cincinnati
Cincinnati, Ohio 45221

Battelle 1970 Census Center
Columbus Laboratories of the
Battelle Memorial Institute
505 King Avenue
Columbus, Ohio 43201

Census Data Center
Economic Research Division
State of Ohio
65 South Front Street
Columbus, Ohio 43215

Oklahoma

University Computer Center
Oklahoma State University
Mathematical Sciences Bldg.
Stillwater, Oklahoma 74074

Oregon

Bureau of Governmental Research
and Service
University of Oregon
P.O. Box 3177
Eugene, Oregon 97403

Center for Population Research
and Census
Portland State University
P.O. Box 751
Portland, Oregon 97207

Pennsylvania

ECOM Consulting, Inc.
607 Washington Road
Pittsburgh, Pennsylvania 15228

Mitchell Marketing, Inc.
P.O. Box 975
Station Square Two
Pottsville, Pennsylvania 19301

Delaware County Planning Commission
Second and Orange Streets
Media, Pennsylvania 19063

Data Access and Technical
Assistance Program (King's College)
Department of Data Processing
King's College
Wilkes-Barre, Pennsylvania 18702

York County Planning Commission
200 South Duke Street
York, Pennsylvania 17404

Boeing Computer Services, Inc.
P.O. Box 5357
Philadelphia, Pennsylvania 19142

Delaware Valley Regional Planning
Commission
Penn Square Bldg.
1317 Filbert Street
Philadelphia, Pennsylvania 19107

Keystone Computer Associates, Inc.
1055 Virginia Drive
Fort Washington, Pennsylvania 19034

Innovative Systems, Inc.
200 Fourth Avenue
Pittsburgh, Pennsylvania 15222

Commonwealth Management Information
Center
Building 135, Bomb Road
Pittsburgh International Airport
Pittsburgh, Pennsylvania 15207

Southwestern Pennsylvania Regional
Planning Commission
564 Forbes Avenue
Pittsburgh, Pennsylvania 15219

Puerto Rico

Computer Solutions, Inc.
300 Ponce de Leon Avenue
Hato Rey, Puerto Rico 00919

Rhode Island

Sociology Computer Laboratory
Department of Sociology
Brown University
Providence, Rhode Island 02912

South Carolina

Berkeley-Charleston Regional
Planning Commission
County Office Building
2 Court House Square
Charleston, South Carolina 29401

Wilbur Smith and Associates, Inc.
4500 Jackson Boulevard
Columbia, South Carolina 29202

Tennessee

Economic Research Department
Cook Industries, Inc.
2185 Democrat Road
Memphis, Tennessee 38116

Center for Business and Economic
Research
College of Business Administration
University of Tennessee
Knoxville, Tennessee 37916

Texas

Alamo Area Council of Governments
400 Three Americas Building
San Antonio, Texas 78205

Boeing Computer Services, Inc.
P.O. Box 58747
Houston, Texas 77058

Computer Center
University of Texas at Dallas
Box 30365
Dallas, Texas 75230

University of Texas at El Paso
Census Summary Tape Processing
Center-Computer Center
El Paso, Texas 79968

Summary Tape Processing Center
Institute of Urban Studies
University of Texas at Arlington
Arlington, Texas 76010

Southwest Center for Urban Research
1200 Southmore
Houston, Texas 77004

Survey Research Sciences, Inc.
1111 North Loop West
Dallas, Texas 75231

Houston-Galveston Area Council
3311 Richmond Avenue
Houston, Texas 77006

Urban Systems Laboratory
University of Houston
Houston, Texas 77024

Wilbur Smith and Associates, Inc.
1555 West Loop, South
Post Oak Park
Houston, Texas 77027

Trinity University
715 Stadium Drive
San Antonio, Texas 78212

Utah

Center for Business and Economic
Research
Brigham Young University
313 Jesse Knight Building
Provo, Utah 84601

Center for Economic and Community
Development
University of Utah
Room 104, College of Business Bldg.
Salt Lake City, Utah 84112

Population Research Laboratory
Utah State University
Logan, Utah 84321

Virginia

ECOM Consulting, Inc.
146 North Sterling Boulevard
Sterling Park, Virginia 22170

Consolidated Analysis Centers,
Inc. (C.A.C.I.)
1815 North Fort Myer Drive
Arlington, Virginia 22209

Computing and Software
3700 Mc. Vernon Avenue
Alexandria, Virginia 22305

Division of State Planning and
Community Affairs - Governor's
Office Building
1010 James Madison Building
109 Governor Street
Richmond, Virginia 23219

National Data Use and Access
Laboratories, Inc. (DUALabs)
Suite 300
1601 North Kent Street
Rosslyn, Virginia 22099

Washington

Urban Data Center
125 More Hall, FW-10
University of Washington
Seattle, Washington 98195

Office of the Governor
Office of Program Planning
and Fiscal Management
House Office Building
State Capitol Campus
Olympia, Washington 98501

Battelle-Northwest
Economic and Operations Research
Department
P.O. Box 959
Richland, Washington 99356

Sociological Data Processing Center
Department of Sociology
Washington State University
Todd Hall, Room 115
Pullman, Washington 99163

Boeing Computer Services, Inc.
P.O. Box 24366
Org. G-1700 H/S 8C-55
Seattle, Washington 98124

West Virginia

West Virginia Housing Development
Fund
900 Charleston National Plaza
Charleston, West Virginia 25301

Wisconsin

Analytical Computer Systems Corporation
1800 E. Capitol Drive
Suite 2F
Milwaukee, Wisconsin 53211

Department of Administration
State Bureau of Systems and Data
Processing
1 West Wilson Street
Madison, Wisconsin 53702

Wyoming

Division of Business and Economic
Research
University of Wyoming, POB 3925
University Station
Laramie, Wyoming 82070

Appendix E

Provided in this appendix is the home interview questionnaire used in the Lafayette Transportation and Development Study.¹² With a few minor changes this type of questionnaire could be used as a mail-in questionnaire for collecting data on non-transit users.



GREATER LAFAYETTE AREA
TRANSPORTATION & DEVELOPMENT STUDY

Tiempocon County Area Plan Commission
Ph. 742-0560

Dear Citizens:

As explained in the letter recently sent to you, your household is one of the number selected, from which we would like to obtain vital, needed travel information in connection with the Greater Lafayette Area Transportation and Development Study.

Each member of your household over 5 years of age will be asked by our interviewer to record all of the trips which he or she makes on _____, from 4:00 AM to 4:00 AM the following day.

Our interviewer will return to your home on _____,

about _____ PM to make the interview.

The interviewer will also provide you with a sufficient number of Trip Reminder Forms that you may keep with you on all trips during the above indicated travel day. Please do not consider this Trip Reminder a substitute for the home interview. It is only an aid for the home interview to save you time.

The information is completely confidential and will be used for statistical purposes only.

Very truly yours,

J. A. Fletcher
Joseph A. Fletcher
Executive Director

GREATER LAFAYETTE AREA TRANSPORTATION AND DEVELOPMENT STUDY

YOUR TRIP REMINDER FOR ALL TRIPS ON _____, -70

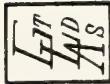
Sample # _____ Tripmaker _____

Please record below all trips you make on this day.

This trip log is only an aid for the home interview, to remind you of all trips you make during the above travel day.

IT IS NOT A SUBSTITUTE FOR THE HOME INTERVIEW.

Trip No.	Trip Location (Please full address or name of company, building, etc.)	Time of		Remarks
		Ar- rival	Next Start	
	I started from _____ and _____ went to _____ City _____ Street Address/Place _____	First Start _____	AM PM	
	From there I went to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	
	Then to _____ City _____ Street Address/Place _____	AM PM	AM PM	



GREATER LAFAYETTE AREA
TRANSPORTATION & DEVELOPMENT STUDY
Tippecanoe County Area Plan Commission

1968 SURVEY QUESTIONNAIRE

(One fill in per person 16 years of age or older)

1 1 1

House number 1 1 1 1 1
Sample number 1 1 1 1 1
Person number 1 1 1

2

254 Perry Street

Lafayette, Indiana 47901

PH. 317-742-0340

1. Each set below contains two statements, A and B. Select the one statement which you feel is more important to you. Show your preference by circling the letter A or B, whichever your choice may be. Circle an A or B for every pair. (Each pair appears only once.)

A. A shorter walking distance to a bus stop
B. More frequent service

A. Lower fare for passengers
B. More protection from weather at public bus stops

A. Making a trip without changing buses
B. Lower fare for passengers

A. More protection from weather at public bus stops
B. A shorter walking distance to a bus stop

A. Making a trip without changing buses
B. More protection from weather at bus stops

A. A shorter time spent traveling in bus
B. Longer hours of available service

A. The assurance of getting a seat
B. Lower fare for passengers

A. More protection from weather at public bus stops
B. Longer hours of available service

A. A shorter walking distance to a bus stop
B. A shorter time spent traveling in bus

A. More frequent service
B. The assurance of getting a seat

A. Making a trip without changing buses
B. Longer hours of available service

- A. A shorter time spent traveling in bus
B. The assurance of getting a seat
- A. Longer hours of available service
B. Lower fare for passengers
- A. More protection from weather at public bus stops
B. A shorter time spent traveling in bus
- A. More frequent service
B. Making a trip without changing buses
- A. Lower fare for passengers
B. A shorter walking distance to a bus stop
- A. More protection from weather at public bus stops
B. More frequent service
- A. A shorter walking distance to a bus stop
B. Making a trip without changing buses
- A. More frequent service
B. Lower fare for passengers
- A. A shorter walking distance to a bus stop
B. Longer hours of available service
- A. The assurance of getting a seat
B. Making a trip without changing buses
- A. A shorter time spent traveling in bus
B. Lower fare for passengers
- A. Longer hours of service
B. The assurance of getting a seat
- A. More frequent service
B. A shorter time spent traveling in bus

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- A. More protection from weather at public bus stops
B. The assurance of getting a seat
- A. Longer hours of available service
B. More frequent service
- A. A shorter time spent traveling in bus
B. Making a trip without changing buses
- A. The assurance of getting a seat
B. A shorter walking distance to a bus stop

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PLEASE DO NOT WRITE BELOW THIS LINE

2 2 3 4 5 6 7 8 9 10 11 12 13 14 15
(Please repeat columns 2 thru 15 from previous card.)

1. The number of blocks from my place of work to the nearest bus stop is.

0 1 2 3 4 5 6 7 8 or more
check here _____ if you cannot answer question.

2. Circle one or more places you go to from your home by bus. Then circle the number of times a week or a month you go by bus, and whether you return by bus. (Consider only non-work trips).

0 1 2 3 4 5 6 7 8 or more
Days a Week

0 1 2 3 4 5 6 7 8 or more
Days a Month

0 1 2 3 4 5 6 7 8 or more
Days a Week

0 1 2 3 4 5 6 7 8 or more
Days a Month

0 1 2 3 4 5 6 7 8 or more
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0 1 2 3 4 5 6 7 8 or more
Days a Week

0 1 2 3 4 5 6 7 8 or more
Days a Month

3. The number of blocks from my place of work to the nearest bus stop is.

0 1 2 3 4 5 6 7 8 or more
check here _____ if you cannot answer question.

4. Circle one or more places you go to from your home by bus. Then circle the number of times a week or a month you go by bus, and whether you return by bus. (Consider only non-work trips).

0 1 2 3 4 5 6 7 8 or more
Days a Week

0 1 2 3 4 5 6 7 8 or more
Days a Month

0 1 2 3 4 5 6 7 8 or more
Days a Week

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Days a Week

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Days a Month

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Days a Week

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Days a Month

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Assuming YOU were to use an improved bus system for transportation, circle the number which shows how important it would be to YOU to have bus service to the place named. For example, if YOU feel it is unimportant for YOU to have bus service to the place named, circle the number (1). If on the other hand, YOU feel it is important to YOU, circle the number (7). If you do not have strong feelings one way or the other, circle one of the numbers between (1) and (7) to show how you feel.

SCHOOLS LAFAYETTE

Unimportant 1 2 3 4 5 6 7 Very important

AMUSEMENT PLACES

Unimportant 1 2 3 4 5 6 7 Very important

PURDUE UNIVERSITY

Unimportant 1 2 3 4 5 6 7 Very important

MARKET SQUARE

Unimportant 1 2 3 4 5 6 7 Very important

ALCOA - NATIONAL MONUMENT

Unimportant 1 2 3 4 5 6 7 Very important

PURDUE RESEARCH PARK

Unimportant 1 2 3 4 5 6 7 Very important

ELI LILLY

Unimportant 1 2 3 4 5 6 7 Very important

COLUMBIAN PARK

Unimportant 1 2 3 4 5 6 7 Very important

SHOPPING (ST. ELIZABETH - BORG)

Unimportant 1 2 3 4 5 6 7 Very important

YMCA - YIPPOCA PALMOLANS

Unimportant 1 2 3 4 5 6 7 Very important

SEAS - SHOPPING AREA

Unimportant 1 2 3 4 5 6 7 Very important

WEST LAFAYETTE SHOPPING AREA (MAMAR VILLAGE)

Unimportant 1 2 3 4 5 6 7 Very important

TRAIL ROAD SHOPPING CENTERS (JEFFERSON SQUARE - LAFAYETTE SQUARE)

Unimportant 1 2 3 4 5 6 7 Very important

POWELL ELECTRIC

Unimportant 1 2 3 4 5 6 7 Very important

GENERAL STORES

Unimportant 1 2 3 4 5 6 7 Very important

List any other places in the Lafayette - West Lafayette area to which you would desire bus service.

10. The following statements concern the commercial operation of a bus service. Indicate how acceptable each method of operation would be to you.

BUS SERVICE SHOULD PAY FOR ITSELF (LOW FARES CHARGED USERS).

Unacceptable 1 2 3 4 5 6 7 Acceptable

BUS SERVICE SHOULD BE SUPPORTED IN PART BY TAXES AND IN PART BY LOCAL TAXES.

Unacceptable 1 2 3 4 5 6 7 Acceptable

BUS SERVICE SHOULD BE FREE WITH EXCESS COST PAID FROM LOCAL TAXES.

Unacceptable 1 2 3 4 5 6 7 Acceptable

11a. Assume that you are making a trip by yourself on the bus within the Lafayette-West Lafayette area. Write, in the space below, what you think would be an acceptable fare for the one-way trip, if the bus picked you up within 2 blocks of your home.

.....Each Way

11b. Assume that you could have the bus pick you up in front of your home rather than the regular bus stop nearest your home. Write in the space below what you think would be an acceptable charge for the one-way trip.

.....Each Way

12. The amount of fare which would be acceptable and realistic would be determined in a market survey. Indicate how acceptable each of the methods described below would be to you.

ONE FIXED FARE REGARDLESS OF DISTANCE TRAVELED

Unacceptable 1 2 3 4 5 6 7 Acceptable

FARE BASED ON DISTANCE TRAVELED

Unacceptable 1 2 3 4 5 6 7 Acceptable

13. Usually the time spent traveling on a public transportation system is longer than would be required by a private automobile. Write in the table below to show what you think would be acceptable trip times on a bus if the time by car were as given on the left side of the table. Do not include any time you might have to spend waiting for the bus to pick you up; consider only the actual time spent riding.

TRIP TIME BY CAR	ACCEPTABLE BUS TRIP TIME
5 MinutesMinutes
10 MinutesMinutes
15 MinutesMinutes
20 MinutesMinutes

PLEASE DO NOT WRITE BELOW THIS LINE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
(Repeat columns 2 thru 15 from previous card.)

never available as only for those regularly employed 5 days a week at the same location.

When you consider purchasing a service that placed you up in front of your home took you to your place of employment and returned you home at the end of the work day.

YES NO

If YES, continue with this question.

Where do you work?

Name of large store or company or street address

When do you start work?

A.M./P.M.

When would be the earliest you would be willing to leave home?

A.M./P.M.

When are you normally finished work?

A.M./P.M.

When would be the latest you would be willing to arrive home?

A.M./P.M.

Circle the amount you would be willing to pay for this monthly service.

- \$ 4.50 (.10 cents per one way trip)
- \$ 9.00 (.20 cents per one way trip)
- \$13.50 (.30 cents per one way trip)
- \$18.00 (.40 cents per one way trip)
- \$22.50 (.50 cents per one way trip)
- \$27.00 (.60 cents per one way trip)

Please fill in the following questions so that we can tell if married people have different preferences than single people and so on.

MARITAL STATUS

- 1. Married
- 2. Single

EDUCATION COMPLETED

- 1. 0-8 years of grade school
- 2. 1 year of high school
- 3. Graduated from high school
- 4. 2 years of college or trade school
- 5. Graduated from college
- 6. Completed graduate degree

EMPLOYMENT

- 1. employed full-time
- 2. employed part-time
- 3. unemployed
- 4. retired
- 5. elementary or high school student
- 6. Purdue student
- 7. housewife

18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Appendix F

Contained in this appendix is a list of a number of transit vehicle manufacturers. Also, provided is a sample specification sheet for recording information on each vehicle type.

List of Bus Manufacturers

1. Highway Products, Inc. (Makes the Twin Coach)
 789 Stow Street
 Kent, Ohio 44240 Seating Capacity Range
 (19-35)
 Phone: 216-673-9821

 2. The Flixbie Co. (Makes the Flixbie)
 Loudonville, Ohio 44842 Seating Capacity Range
 (19-53)
 Phone: 419-994-4141

 3. GMC Truck and Coach (Makes GMC Transit Coaches)
 Division of General Motors
 Corporation Seating Capacity Range
 Coach Advertising Department (33-53)
 Pontiac, Michigan 48053
 Phone: 313-335-4111

 4. Minibus Inc. (Makes the Minibus)
 Creative Transportation System
 7711 Paramount Blvd. Seating Capacity Range
 Pico Rivera, California 90660 (19-23)
 Phone: 213-723-9071
- East Coast Sales Office:
 900 Ohio Drive S.W.
 Washington, D.C. 20024
 Phone: 202-638-5014

5. Motor Homes Inc. (Makes the Ford Courier)
3709 West Erie Avenue
Lorain, Ohio 44053 Seating Capacity Range
(10-15)
Phone: 216-245-9755
6. Metropolitan Coach Corporation (Makes the Metropolitan
Coach)
4201 S. Congress
P.O. Box 3255
Austin, Texas 78704 Seating Capacity Range
(Special order any size)
Phone: 512-442-1401

1. Body structure:

- a. _____ Chassis body or _____ Integral
- b. _____ Riveted or _____ Welded
- c. _____ Length
- d. _____ Width
- e. _____ Standard number of seats (and seat configurations available)
- f. _____ Height, ground to first step
- g. _____ Number of steps
- h. _____ Height, ground to floor (at front axle)
- i. _____ Flat floor (transit only)
- j. _____ Headroom
- k. _____ Approximate unloaded weight
- l. _____ Weight on front axle
- m. _____ Weight on rear axle

2. Suspension:

- a. _____ Wheelbase
- b. _____ Track - front
- c. _____ Track - rear
- d. _____ Turning radius over outside
- e. _____ Turning radius of body (front corner)
- f. _____ Type (air, leaf-spring, etc.)
- g. Steering manufacturer and model _____
- h. Rear axle manufacturer and model _____

3. Engine (recommended for given specs):

- a. Location _____
- b. _____ Inline or _____ Transverse
- c. Manufacturer _____
- d. _____ Gas or _____ Diesel
- e. Configuration (6, V-6, V-8, etc.) _____
- f. Displacement _____
- g. Peak hp/rpm _____
- h. Peak torque/rpm _____
- i. Estimated engine life before major overhaul _____

4. Brakes:

- a. Type _____
- b. Total area _____
- c. Estimated life _____

5. Transmission:

- a. Manufacturer _____
- b. Model _____
- c. Type (torque, conv., 3-speed, etc.) _____

FIGURE F1

6. Performance:
- a. Acceleration _____
0-20 mph _____
0-30 mph _____
0-40 mph _____
 - b. Maximum grade _____
 - c. Braking _____
7. Ventilation and lighting:
- a. Heat type (recirculating or fresh air) _____
 - b. Air conditioning capacity _____
 - c. Air conditioning type (integral w/ heat or other) _____
 - d. Candle-power at reading plane _____
8. Other specifications:
- a. Seat spacing _____
 - b. Aisle width _____
 - c. Fuel tank capacity _____
 - d. Standard tire size _____
 - e. Front axle capacity _____
 - f. Rear axle capacity _____
 - g. Estimated fuel mileage _____
9. Typical price for the coach, rounded to the nearest \$1,000.00. _____
10. Items normally considered optional equipment _____

FIGURE F1 (Continued)

Appendix G

Provided in this appendix are the bid forms and specifications from the Greater Lafayette Public Transportation Corporation.¹⁴ Forms and specifications of this type must be developed if federal money is to be used for the purchase of new equipment.

NOTICE TO BIDDERS

Bidder _____
Bid No. _____

Notice is hereby given that the Board of the Greater Lafayette Public Transportation Corporation will receive sealed bids in the office of the Corporation, 920 Perry Street, Lafayette, Indiana to _____ (EST) _____, for the following equipment and/or supplies:

SIXTEEN (16) MEDIUM SIZED, AIR-CONDITIONED, TRANSIT TYPE MOTOR COACHES

GREATER LAFAYETTE PUBLIC TRANSPORTATION CORPORATION

Specifications are on file in the office of the Corporation.

Bids shall be submitted on Regular Bid Form No. 95 which may be obtained at the office of the Corporation. All bids must be accompanied by Bidders Bond, Certified Check or cash in an amount equal to five percent (5%) of the total bid price, and a non-collusion affidavit, and in all particulars must comply with the laws of the State of Indiana.

The Board of the Greater Lafayette Public Transportation Corporation reserves the right to reject any and all bids.

Bids received after the specified time, will be returned unopened to the bidder.

ATTEST:

BOARD OF THE GREATER LAFAYETTE
PUBLIC TRANSPORTATION CORPORATION

Board Secretary
PUBLISH: _____

ADVERTISEMENT, FORM OF
PROPOSAL, SPECIFICATIONS,
BIDDERS BOND, FORM OF
AGREEMENT, PERFORMANCE
BOND, CONDITIONS AND
INSTRUCTIONS TO BIDDERS,
AND GENERAL INSTRUCTIONS

For

SIXTEEN (16)
MEDIUM SIZED
TRANSIT TYPE MOTOR COACHES



GREATER LAFAYETTE PUBLIC TRANSPORTATION CORPORATION
Lafayette, Indiana 47901

BOARD OF DIRECTORS
Mayor W. Washington
Chairman
William E. Farnsworth
Charles L. Baker
Jack B. Cox
Gordon A. Light
Charles P. Smith
James H. Williams

Phone: 317-742 1475

DATE: _____

REQUEST FOR QUOTATION - NO:

THIS IS NOT AN ORDER

FOR DELIVERY TO: Greater Lafayette Public Trans. Corp.

Lafayette, Indiana 47901

SEALED BIDS NOT

SIXTEEN (16) 25 to 30 Passenger Air-Conditioned Buses per the attached specifications.

PRICE PER UNIT \$ _____
TOTAL DELIVERED PRICE \$ _____

DELIVERY DATE: _____

CASH DISCOUNT TERMS: _____
DATE: _____ COMPANY: _____
BY: _____

TITLE: _____
ADDRESS: _____
CITY: _____
TELEPHONE: _____
PLEASE RETURN "AT ONCE" TO:
GREATER LAFAYETTE PUBLIC
TRANSPORTATION CORPORATION
P.O. BOX 586
LAFAYETTE, INDIANA 47901



GREATER LAFAYETTE PUBLIC TRANSPORTATION CORPORATION
Lafayette, Indiana 47901

BOARD OF DIRECTORS
Mayor W. Washington
Chairman
William E. Farnsworth
Charles L. Baker
Jack B. Cox
Gordon A. Light
Charles P. Smith
James H. Williams

Phone: 317-742 1475

SPECIFICATIONS

BUS QUESTIONNAIRE

1. Name of Bidder _____ Date _____
2. Make of Bus _____ Model _____ WB _____ in., CA _____ in.
3. Make of Engine _____ Model _____ Fuel _____ Cylinders _____
Displacement _____ cu. in. Max. Wt _____ lb. ft. Net H.P. _____
4. Make of Transmission _____ Model _____ Type of brakes _____
5. Clutch Diameter _____ in., Effective Area _____ sq. in.
6. Make of Front Axle _____ Model _____ Capacity _____ lbs.
7. Make of Rear Axle _____ Model _____ Capacity _____ lbs.
8. Front Springs: Capacity & Ground _____ lbs. _____ lbs., Aux. _____ lbs.
9. Rear Springs: Capacity & Ground: Main _____ lbs., Aux. _____ lbs.
10. Cab & Chassis Weight _____ lbs. GVW _____
11. Tires: Type, Size & Ply, Front and Rear _____ Dual or Single Rear _____
12. Make of Body _____ Model _____
13. Seat Size _____

GREATER LAFAYETTE PUBLIC TRANSPORTATION CORPORATION

Lafayette, Indiana

STATEMENT OF PAYING PREVAILING WAGE AND FRINGE BENEFIT

I, , OFFICIAL TITLE
of , do hereby certify that prevailing
wage and fringe benefits, as determined by statistics compiled by the United
States Department of Labor and related to the Greater Lafayette area by said
department, will be paid for labor hired and paid on NAME OF CONTRACT
 . Proof of compliance will be furnished before payments
are made on this contract.

SIGNATURE

Subscribed and sworn to before me this Name of
 day of 19 Notary
Country
Commission Expires
SIGNATURE OF NOTARY PUBLIC
(Type, print or stamp)

CHECK SHEET TO BE RETURNED WITH BID

	<u>YES</u>	<u>NO</u>
1. Does proposal conform to specifications entirely?	()	()
2. Are exceptions and deviations listed?	()	()
3. Does Proposal contain experimental components?	()	()
4. Are you familiar with Metropolitan Lafayette's Transportation?	()	()
5. Are all manufacturer's certifications attached?	()	()
Engine		
Alternator		
Frame		
Road transmission		
Pump transmission		
Steering		
Brakes		
Load carrying capacity		
6. Is the certified repair parts statement attached?	()	()
7. Are requested descriptive brochures and drawings enclosed?	()	()
8. Are load ratings and limits described?	()	()
9. Are component ratings by manufacturer enclosed?	()	()
10. Are metal gauges and material specified?	()	()
11. Are the number and size of compartments included?	()	()

LIST OF ITEMS TO BE SUPPLIED WITH PROPOSAL

<u>DESCRIPTION</u>	<u>PAGE</u>	<u>ITEM</u>
Proposal Deposit.....	11	10
Terms of Payment.....	14	33
Policy on Warranty.....	13	22
List of Transportation Plans.....	13	29
Letters of Certification Re: Horsepower adequacy compliance with criteria on Air Pollution.....	9-10	3
Location of Parts Warehouse.....	13	23
List of Units.....	10	6

CENTRAL PROVISIONSPOST BID REQUIREMENTS (By successful bidder)

Performance Bond.....	12	11
Documents for Securing Title.....	13	25
Supply Weight Slips.....	12	18
Furnish Sample Seat Materials.....	25	19
Furnish Paint Charts.....	30	41
Maintenance & Parts Books.....	32	46

POST BID REQUIREMENTS (By the CLP/PC)

List of Sign Readings.....	24	14
Determine Seat Colors.....	25	19
Determine Paint Scheme.....	30	41
Supply Location of Conch Numbers.....	31	42

GENERAL PROVISIONS

The Greater Lafayette Public Transportation Corporation, Tenth and Perry Streets, Lafayette, Louisiana hereinafter called "G.L.P.T.C." requests quotations from manufacturers of transit buses, under the following requirements and conditions, which shall be considered an essential part of specifications and proposal:

1. The buses described in these specifications are to be purchased with the assistance of a grant from the Federal Government under the Urban Mass Transportation Act of 1964. The successful bidder will be required to comply with all terms and conditions prescribed for third party contracts in a grant contract between the United States of America and the Purchaser. This grant contract is available for examination by prospective bidders at the office of the Purchaser.

2. The award of a contract for the purchase of these vehicles is subject to the concurrence of the U.S. Department of Transportation (D.O.T.). Any change in the contract, likewise, shall be submitted to D.O.T. for prior written approval.

3. The contract between the Purchaser and the successful bidder shall contain the following provisions:

(a) Equal Employment Opportunity. In connection with the carrying out of this project, the contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other compensation; and selection for training, including apprenticeship.

(b) Prohibited Interests. No member, officers, or employees of the Public Body, Transit Authority, Commission, or locality during his tenure or for one year thereafter shall have any interest, direct or indirect, in this contract or the proceeds thereof.

(c) Interest of Members or Delegates to Congress. No member of or delegate to the Congress of the United States shall be admitted to any share or part of this contract or to be any benefit arising therefrom.

(d) Air Pollution Criteria. The contractor hereby certifies that:

(1) Horsepower of the vehicle to be furnished is adequate for the speed and terrain in which they will operate. Such horsepower includes the requirements of auxiliary power equipment.

(2) Gases and vapors emanating from the crankcase of spark ignition engines are controlled in such a manner as to minimize their escape to the atmosphere. (Such control may provide for the return of such gases to the induction system of the engine.)

(d) Air Pollution Criteria (Continued)

(3) Visible emissions from the exhaust pipe will not exceed #1 on the Ringelmann Scale when measured at the point 6 inches from the tail pipe with the vehicle in a steady state of operation.

(4) When a vehicle has idled for 3 minutes and then accelerates to 80% of rated speed under load, the capacity of the exhaust will not exceed #2 on the Ringelmann for more than 5 seconds and not more than #1 Ringelmann thereafter.

(e) The attached check sheets, truck questionnaire and prefilling wage statement must be completed.

4. These specifications state detailed requirements for transit type coaches of twenty-five (25) - thirty-five (35) passenger capacity, propelled by a heavy-duty V type liquid propane (fuelled) engine, equipped with automatic transmission. The coaches shall be a minimum of 96 inches in width and an overall maximum length not to exceed thirty (30) feet.

5. It is the intent of these specifications to provide for a coach of first quality, and the workmanship must be the best obtainable in the various trades. The design of the body and equipment which the manufacturer proposes to furnish must be of such as to produce a vehicle of substantial and complete in every detail. The successful bidder must furnish a complete set of drawings of the proposed vehicle and must provide the complete vehicle and all working and moving parts and operation devices shall be thoroughly tested and put in operating condition by the manufacturer, or his duly appointed agent.

6. Bids must be accompanied by a comprehensive description of bidders standard product. The quality of standard components, not covered by the language of these specifications, will be a factor in determining a bid award. No advancement will be made by the bidder or manufacturer in the omission of any part or detail which is not specifically mentioned in the specifications, even though each part is not mentioned in this specification.

7. All bids must be in strict compliance with the requirements and provisions of these specifications, including the provisions herein regarding "approval", "approved equals", and "deviations". Where a feature, component, or item is "approved equal" in these specifications, the words "or approved equal" will apply. Where the approval of the Purchaser is specifically required by these specifications in connection with a particular feature, or if the bidder desires to submit a bid which is not an "approved equal" to the specifications, specific requirements of these specifications, the bidder must submit an approval, confirmed in writing, prior to the date for the bid opening. With respect to "approved equals" or "deviations", the details of same, and the reasons and justifications therefore, must be submitted to the Purchaser, including a statement whether the bidder has previously furnished, or offered to furnish, the item in question as herein specified. Bids may be submitted containing any such approvals, approved equals or deviations as are specifically approved by the Purchaser, confirmed in writing, prior to bid opening date. Each bid must be accompanied by documentation regarding any such

7. (Continued)

appeals granted by the Purchaser for that bid. Notice of any such approvals given to a bidder shall be furnished by the Purchaser to all prospective bidders at least five days prior to bid opening date. Any unapproved alterations, exceptions, substitutions, alternates, or conditional qualifications contained in a bid may be cause for its rejection.

Protests concerning the specifications or bidding procedure, request for clarification of the specifications and requests for the substitution of "approved equal" items must be submitted, in writing, to the Greater Lafayette Public Transportation Corporation not less than 21 days before bid opening. Any protests or requests for clarification of specifications must be fully supported by evidence that the substitute offered is equal to or better than the specification requirement.

Greater Lafayette Public Transportation Corporation will accept or reject any request under the foregoing subparagraph, in writing, not less than 14 days before bid opening. Any change in the specifications will be effected by the issuance of an addendum.

Any appeal from the decision of the Greater Lafayette Public Transportation Corporation will be received, in writing, to UMTRA not less than 7 days before bid opening. Appeals received by UMTRA later than 7 days before bid opening will not be considered.

8. All coaches shall be in complete compliance with all requirements of the laws of the State of Indiana and the Federal Motor Vehicle Safety Standards as established by the U.S. Department of Transportation.

9. Purchaser reserves the right to accept any bids, or to reject any or all bids, or to void the contract for the purchase of the motor coaches on such basis as Purchaser deems to be in its best interest.

10. As security for the acceptance of the contract, each bid shall be accompanied by a certified check or bid bond in the amount of five per cent (5%) of the Bid, rounded to the nearest thousand dollars drawn payable to the Purchaser. Such bid deposits of all bidders will be held by Purchaser until all proposals submitted shall have been canvassed, and the bids have either been rejected in whole, or in part, or the award of the contract or contract has been made. In the event the successful bidder will be held until the contract is duly bid deposit is returned to the bidder. All unsuccessful bidders within two weeks after the award of the contract. If the successful bidder fails to furnish the performance bond herein prescribed within seven days after the award of the contract the amount of the bid deposits shall be forfeited to and retained by the Purchaser as liquidated damages for such neglect or refusal.

All bids received shall remain in effect for 30 days from bid opening.

11. The successful bidder shall furnish at his own expense a performance bond payable to the Purchaser in the amount of one hundred percent (100%) of the full amount of the contract as a guarantee of good faith on behalf of the contractor that the terms of these specifications will be complied with in every particular.
12. The price to be quoted in any proposal submitted shall include all items of labor, materials, tools, equipment and other costs necessary to fully complete the manufacture and delivery of the coaches pursuant to the specifications. It is the intention of these specifications to provide and require that all items of the type prescribed be ready for operation. Any items omitted from such equipment and its accessories shall be considered the completion of such equipment and its accessories shall be considered a portion of such equipment although not directly specified or called for in these specifications.
13. Bids shall be submitted on terms "Net-30-days".
14. Purchaser is exempt from payment of all Federal, State, and local taxes in connection with this purchase. Said taxes must not be included in bid amount. Purchaser will provide necessary tax exemption certificates to manufacturer.
15. The earliest possible delivery time is urgently required; therefore, bidder must submit the earliest possible delivery date, but all buses must be completed and delivered no later than 180 days following the date of award.
16. In the event of delay in the completion of delivery of coaches beyond the date the successful bidder specified, the Purchaser shall assess as liquidated damages, one-hundred (\$100.00) dollars per day per coach.
17. In case the delivery of completed coaches under the terms of these specifications and related purchase contract shall be necessarily delayed because of strikes, injunctions, Government controls, or by reasons of any cause or circumstances beyond the control of the contractor, the time of completion of delivery shall be extended by a number of days to be determined in each instance by mutual agreement between Purchaser and contractor.
18. The bidder shall state with his bid the weight per coach for the coach on which bid is based. The bidder shall also state the specifications. The stated weight shall be for an empty coach, complete with all required equipment, complement of fuel, oil and water. Purchaser may require verification of weight stated to bid as condition of acceptance of delivery of coaches.
19. The coach manufacturer shall assume responsibility of all materials and accessories used in the vehicles, whether the same is made by the coach builder or purchased, ready-made, from an outside source.
20. Successful bidder must agree to save, keep, bear, harness, and fully indemnify the Purchaser and its employees and agents from all damages, costs or expenses in law or equity, whether or not time lost or lost time or for any infringement of the patent rights of any person or persons in con-

sequence of the use by the Purchaser or by any of its employees or agents, the supplier, in writing, shall be held harmless. The bidder shall be held harmless for any and all damages, claims, suits, losses, and expenses, including reasonable attorney's fees, which may be incurred by the Purchaser or any of its employees or agents, arising from his submitted and which the bidder lawfully initiates or causes to be initiated. The bidder shall give the successful bidder prompt notice in writing of the initiation of any such claim, suit, loss, or expense, and shall defend and permit the successful bidder through his counsel to defend same and will give all needed information, assistance and authority to enable successful bidder to do so.

21. Bids shall provide for delivery of coaches to garage of Purchaser at Lafayette, Indiana.
22. Bidder shall submit details of the warranty provisions offered, at least 14 days prior to bid opening date, for review and acceptance by the Purchaser.
23. Bidder shall state with his bid location of parts warehouse which will serve the Purchaser, and give best estimate as to time that will be required to deliver most parts anticipated to be required. Bidder must guarantee in his bid that replacement parts will be made available for a period of not less than ten (10) years.
24. Bidder shall state with his bid the names and locations of technical service and parts representatives available to assist the Purchaser with information and advice regarding maintenance of the coaches.
25. Each proposal will be submitted with the understanding that the acceptance in writing by Purchaser of the offer to furnish any or all of the vehicles described therein, shall constitute a contract between the bidder and the Purchaser which shall bind the bidder on his part to furnish and deliver at his bid price, and in accordance with conditions of said accepted proposal and specifications.
26. Bidder shall submit with his bid a list of parts with prices for a representative running parts inventory, and including prices on components such as engine, transmission, alternator, etc.
27. Bidder shall submit with his bid one copy each of maintenance manual, parts book and operator manual applicable to coaches on which bid is submitted. Suitability of this material may be considered in evaluation of bids. Successful bidder shall, at least fifteen (15) days prior to delivery of the coaches, furnish copies of such material in sufficient quantity to satisfy requirements of Purchaser, and compliance with this requirement may be made a condition for acceptance of delivery of the coaches.
28. In determining successful bidder consideration will be given to price, financial responsibility of bidder, responsiveness to these specifications, and suitability of the vehicles offered for use in the local transit system. Conditional or qualified bids shall be rejected.
29. Bidder shall provide with his bid, for the coach on which bid is submitted or its predecessor model having the same or comparable engine and transmission, showing names of purchasers and approximate delivery dates of all deliveries of such coaches for a period of at least the last two years.

30. Conditional bids, or those which take exception to the specifications, will be considered non-responsive and will be rejected.
31. Bids must be submitted on the form provided. Bids submitted in any other form will be considered non-responsive and will be rejected.
32. Acceptance of delivery of any coach or coaches shall not release the contractor from liability for faulty workmanship or materials appearing even after final payment has been made. The Greater Lafayette Public Transportation Corporation reserves the right and shall be at liberty to inspect all materials and workmanship at any time during the manufacturing process and shall have the right to reject any materials or workmanship which do not conform to the specifications provided, be it in writing or by telephone. The Public Transportation Corporation is under no duty to make such inspections, and if such inspection is made, the contractor shall not be relieved of any obligations to furnish materials and workmanship strictly in accordance with specifications.
33. Each proposal shall state terms of payment proposed, it being understood that the Greater Lafayette Public Transportation Corporation shall pay or arrange for payment, therefore, only against delivery and acceptance of coaches pursuant to these specifications.
34. Each bidder shall familiarize himself with all of the attached forms, advertisement, instructions, specifications, drawings, bonds and agreement, as he will be held responsible to fully comply therewith. Each bidder shall acquaint himself with the conditions affecting the work.
35. Each and every bidder who submits his bid specifically waives any right to withdraw it except as hereinafter provided. Bidders will be given permission to withdraw any bid after it has been deposited with the GLPTC and before the bid opening. Bidders are requested to telephonically or in writing advise the GLPTC of any withdrawal of bids prior to the bid opening. Requests pertaining to withdrawal by telephone or telegraph must be confirmed in writing by the bidder and must reach the Office of the General Manager of the Greater Lafayette Public Transportation Corporation not later than one (1) hour prior to the time fixed for submission of bids.
36. Bidders may be required to submit duplicate sworn statements of their financial responsibility, technical qualifications and performance record before contract can be awarded to them.
37. No contract may be assigned, sublet or transferred without the written consent of the Greater Lafayette Public Transportation Corporation. The enumeration in these conditions and instructions of certain rights and remedies of the Greater Lafayette Public Transportation Corporation shall not be construed to preclude the exercise by the Greater Lafayette Public Transportation Corporation of other and additional rights and remedies which are available generally at law or which may be implied from the foregoing.

36. The estimated quantities given in this proposal are for the purpose of bidding only. The Greater Lafayette Public Transportation Corporation may purchase more or less than the estimated quantities, and the bidder does not assume that such estimated quantities are part of the contract.

SPECIFICATIONS

for

SIXTEEN (16)

MEDIUM SIZED

LIQUID PROPANE GAS POWERED

TRANSIT TYPE MOTOR COACHES

April, 1972

GREATER LAFAYETTE PUBLIC TRANSPORTATION CORPORATION

Lafayette, Indiana 47901

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DETAILED SPECIFICATIONS

For

LIQUID PROPANE GAS POWERED TRANSITTYPE MOTOR COACHES1. GENERAL:

- a. These specifications cover transit type motor coaches of 15-30 passenger seated capacities with automatic transmission, propelled by a single, heavy duty industrial V type engine mounted in the rear, outside width not to exceed 76 inches, length over bumpers not to exceed 30 feet.
- b. Contractor will incorporate in his coach the latest technological advancements in the art of building motor coaches to achieve maximum service and attractiveness of appearance.
- c. The coach shall be front entrance, rear exit type.
- d. The body shall be built with suitable and easily accessible compartments for all apparatus, sound damping insulation wherever needed, and all equipment shall be secured in place and kept all noise and vibration to a minimum. Coach body shall be integral in design.
- e. No advantage shall be taken by the contractor in the omission of any part or detail which goes to make the coach complete and ready for service, even though such part or detail is not mentioned in the specifications.
- f. The contractor shall assume responsibility for all material and accessories and their proper installation, used in the coach whether the same were furnished by the contractor, or purchased, ready made, from a source outside the contractor's company.
- g. The coach shall be capable of negotiating a ten (10%) percent grade at ten (10) miles per hour with a full seated load and twenty (20) standees.
- h. The net weight of the 15-30 passenger capacity coach shall not exceed 14,000 pounds. Any weight in excess shall carry a penalty of 50c per pound which shall be deducted from the contractors invoice to the GLPTC. In analyzing bid prices, the overweight penalty will not be considered. Weight of 15-30 passenger coaches furnished by each coach immediately following delivery of the last coach and before permit is made.
- i. The motor vehicles will comply with the Motor Vehicle Safety Standards as established by the U.S. Department of Transportation and the State of Indiana.

j. Each coach shall be delivered by a mutual agreed method to the City of Lafayette, Indiana in first class condition, complete and ready for service and the contractor shall assume all responsibility and liability incident to such delivery.

k. If any coach is delivered incomplete or incorrect, or does not pass the Indiana State Vehicle Inspection, or contains defective or damaged parts, said parts shall be removed and new or repaired parts, acceptable to the GLPTC, shall be furnished and labor for removal and installation of said parts shall be free of all costs to the GLPTC, including the transportation charges on said parts.

l. If the work involved in repairing or placing the coach/coaches in proper condition reaches a magnitude where the GLPTC cannot supply the space or labor for the necessary corrections, such replacement or repairs shall be made at the contractors expense. The contractor shall be responsible for it necessary to perform any work on any coach which should have been performed by the contractor within the intent of these specifications, the contractor agrees to reimburse the GLPTC all costs incident thereto, including material, labor and overhead.

2. REAR AXLE

- a. The rear axle shall be heavy duty, with minimum 15,000 pounds capacity with hypoid gears.
- b. The rear adjustment on twelve of the coaches shall be such as to provide top speed of at least 55 M.P.H. (i.e., when operating on level terrain) at 2000 R.P.M. The rear axle shall be such as to provide top speed of at least 65 M.P.H. (i.e., when operating on level terrain) at manufacturers maximum engine R.P.M.
- c. Provision shall be made for ample reserve of lubricants. Drain and filler plugs shall be of magnetic type.

3. FRONT AXLE

- a. The front axle shall be Rockwell-Standard or equal and so designed as to provide proper wheel and axle geometry.
- b. Radius rod controlling the caster must be adjustable while in position.
- c. Front axle nut shall not have closed in backing plates but should be equipped with brake splines affording complete visibility of brake components.
- d. Front axle shall be of proper size to carry loads imposed upon it by street and other conditions encountered in the Greater Lafayette area of operation.

7. ELECTRICAL SYSTEM (Continued)

- d. clipped with rubberized wiring harness clips and installed according to SAE recommended practices. The electrical system shall be protected by the use of circuit breakers. All electrical junctions, fuses, circuit breakers, and miscellaneous units shall be readily accessible. All splicing wires shall be made of heavy duty copper wire.
- e. A coil of wire shall be provided under the floor below the rear foot location which will connect the circuit breaker controlling circuit shall be provided on instrument panel.

- f. Special wiring shall be factory installed as required for both a two-way radio and an AM-PM radio. All wiring required for speakers and the speakers themselves shall also be factory installed. Four 5" high quality speakers shall be required per coach.

8. INSTRUMENTS AND CONTROLS

- a. The control panel shall be mounted to the left of the driver on the coach wall. Individual circuit breaker type switches shall control all lighting and electrical units. Door control switches shall be toggle type. A master control switch of 120 amperes circuit breaker type to enable entire system to be secured shall be provided. All controls must be within easy reach of driver's position.

- b. Instruments shall be installed on control panel and shall consist of:

1. Speedometer and Odometer.
2. Battery condition indicator.
3. Engine Temperature needle gauge and overheated engine warning light and warning buzzer.
4. Air pressure needle gauge with light and audible warning buzzer.
5. High beam indicator light.
6. Low beam indicator light.
7. Turn signal indicator light.
8. Oil pressure indicator flasher light.
9. Oil pressure needle gauge and audible warning buzzer and light.
10. Transmission oil temperature needle gauge.
11. Engine oil temperature needle gauge.
12. LRC fuel level needle gauge.

9. BRAKES

- a. Service brakes shall be air operated. Brake lining area shall be of a minimum of 500 square inches and shall be capable of providing smooth stop under continuous operation as encountered in the Greater Lafayette area. Service brakes shall be capable of stopping the vehicle at a deceleration rate equivalent to a stop within 22 feet from a speed of 20 MPH. All air brake controls shall be Bendix Westinghouse or approved equals, with a quick release type rear brake valve. A spring type secondary braking system or similar "fail-safe" system shall be provided.
- b. Parking brake shall be provided and shall be a part of the rear axle brake system. Operating valve shall be located to the left of the driver's seat of the coach operator. Tell-tale light for parking light shall be mounted on the shift lever housing. Parking brake shall be capable of stopping vehicle at a deceleration rate equivalent to a stop within 50 feet from a speed of 20 MPH.

4. SPRINGS

- a. If full air suspension system is required which functions by compressed air, it shall be regulated by leveling valves. System must maintain constant height of body in relation to axles regardless of load. Air supply shall be from main coach air system and a pressure regulating valve shall protect against air loss from leaks or failure of the suspension system.

- b. To control lateral, longitudinal, and torsional movement adequate radius rods shall be provided.

- c. If the bidder is unable to supply air suspension, leaf type springs of adequate capacity to handle the load weights will be acceptable. Spring bushings shall be rubber and shall be replaceable.

5. SHOCK ABSORBERS

- a. Heavy duty shock absorbers are to be provided on each side of both front and rear axles.

6. STEERING

- a. Steering gear ratio and design shall be such as to preclude the need for power steering. Steering must operate without undue effort and shall not require more than seven complete turns of the steering wheel for full from wheel travel.
- b. Provision shall be made for external adjustment of bevel gears and axle unit.
- c. Steering gear shall be Ross Cam and Lever, or approved equal.

7. ELECTRICAL SYSTEM

- a. The Alternator shall be heavy duty twelve (12) volt having a minimum capacity of 120 amperes and shall be capable of providing a minimum of 100 ampere-hour rating battery shall be provided and shall be negatively grounded.
- b. A transistorized voltage regulator shall be provided, so designed as to maintain proper control of power flow. It must be mounted for easy access and protected from dust and dirt.
- c. A 205 ampere-hour rating battery shall be supplied. The battery shall be mounted in a readily accessible place. Mounting tray and terminals shall be treated to prevent corrosion.
- d. All electrical wiring in the engine compartment shall have flame resistant, non-absorbent insulation. All electrical wiring and harness shall be located and meet SAE specifications and shall be adequately

9. BRAKES (Continued)

- c. Provide three (3) air tanks with minimum reservoir capacity totaling 3,300 cubic inches.
- d. The coach shall be equipped with an air compressor of minimum capacity of 7 1/2 cubic feet of free air or approved equal make.
- e. Air tanks shall be equipped with manual drain valves.

10. INTERIOR LIGHTING

- a. The front entrance and rear exit step wells shall be lighted by step well lights, suitable mounted and of a brilliance so that the entire step well and not less than two (2) feet of the adjacent ground area outside the coach is well illuminated.
- b. Floor/seat light fixtures shall be provided in the passenger area of an intensity to provide well lighted seat areas, or three sections of fluorescent tubes mounted end-to-end in the center of the ceiling over the main aisle.
- c. Provide individual light, separately controlled over drivers' area.
- d. Illuminate drivers instrument panel.
- e. Adjustable drivers light.

11. EXTERIOR LIGHTING

- a. Provide exterior lighting at all points as required by the state of Indiana and I.C.C. Regulations.
- b. Provide I.C.C. exterior type reflectors in locations as required by law.
- c. Provide sufficient lighting, controlled from compartment, to enable night time inspection of engine compartment.

12. ENGINE

- a. The coach shall be powered by a heavy duty V type LPG fueled engine, capable of giving satisfactory life and performance under conditions which prevail in the Greater Lafayette area.
- b. The engine shall be equipped with a hardened crankshaft, stellite valve seats, sodium cooled exhaust valves, hydraulic lifters and valve rotators. The engine shall have a minimum horsepower of 194 at 3200 RPM and a net torque of 355 2400 RPM. The engine shall require no frequent inspection or re-adjustment. The engine shall be readily accessible to the operator. The engine placement shall be readily accessible to the operator. The engine shall be specifically factory built for LPG fuel consumption.

12. ENGINE (Continued)

- c. The power plant shall be demountable as a complete unit, including transmission.
- d. Air cleaners shall be provided and shall be so mounted that elements can be easily removed and replaced.
- e. Engine to be equipped with full flow oil filter of ample capacity. It is to be located for easy removal and replacement of a completely throw away type filter element.
- f. Starter shall be 12 volt and of ample capacity to furnish sufficient torque to crank engine.
- g. Provide starter switch and engine run control switch in the engine compartment.
- h. A panel or door shall be installed to provide access to the engine from the interior of the coach.

13. HEATING AND WINDSHIELD DEFROSTED

- a. Provide a filtered fresh air circulating type with dual fans. Provide an auxiliary circulating pump for equal heat distribution with ball bearings.
- b. Rear heaters shall have a minimum output of 78,000 BTU, front heater shall have an output of 35,000 BTU.
- c. Heating system shall be designed to afford maximum comfort to passengers and operators.
- d. Drivers defroster fan mounted on lower wind shield header-adjustable with separate switch on console panel.

14. SIGNS

- a. Front destination sign box (to be roof mounted) is to provide single certain to accommodate 15 readings. Minimum opening to be 6" x 48".
- b. Provide drivers visibility door on inside of coach and manual sign operator.
- c. The sign box shall be illuminated so as to provide good visibility.
- d. List of sign readings, not to exceed fifteen (15) will be supplied to successful bidder following award of contract.
- e. A destination sign shall also be installed on the right side of each coach. The sign shall be mounted at a side window that is adjacent to front entrance door of coach. Five easily mountable signs shall be supplied per coach. A list of sign readings shall be supplied to successful bidder.

13. MIRRORS

a. Provide mirrors as follows:

1. 2-8" x 8" rear view mirrors, installed for maximum driver visibility.
2. 1-4" x (minimum) 22" driver's rear view mirror.
3. 1-12" convex mirror mounted over rear stepwell.

16. STATIONHOUSES

- a. All stationhouses shall be 14" stainless steel clad and shall be placed conveniently for passenger safety.
- b. Provide vertical stationhouses at inside corner of each stepwell with horizontal rail to body side. Provide vertical stationhouse at right rear of driver from floor to ceiling. Provide a guard rail to right and rear of driver. Provide one vertical stationhouse from seat to ceiling grab rail for every other longitudinal seat position. Provide vertical stationhouse forward side of exit door. Provide stationhouse at entrance and exit step wells. The location and arrangement of all stationhouses, rail and the type of fittings to be used are to be approved by the purchaser.

17. SPLASH APRONS

- a. Wheelhouse splash aprons, made of not less than one quarter (1/4) inch rubber and composition material shall be provided to the rear of each wheel housing, projecting downward to a point within three (3) inches of the ground when empty. Rear aprons shall be sufficient distance from rear of wheelhouse to prevent damage from broken chains. All wheelhouse fenders shall have rubber mounted exterior fenders.

18. ENGINE COMPARTMENT

- a. The engine compartment shall be sealed so that smoke and fumes do not enter the passenger compartment of the coach. Insulate behind seat back and under seat cushion of rear lounge seat.
- b. Engine compartment shall be insulated to minimize engine noise.

19. SEATING

- a. Provide seating for 25-30 passengers on all coaches.
- b. Seats to be Model WTT Haywood Wakefield or equal, and upholstered with transportation quality 42 OZ. Super Tamara fabric or approved equal. Seat cushions to be of spring construction with 1" Drebach Topper. Successful bidder to furnish samples and to recommend color combinations following award of contract.
- c. Seat backs shall be leather patterned anodized aluminum.
- d. Seats shall be well mounted and supported on aisle side by two (2) pedestal legs.
- e. Frames shall be constructed of tubular steel and enameled, with stainless steel top rail. Cushion and back shall be removable.

20. COACH DIMENSIONS

a. The following coach dimensions, indicated as "minimum" or "maximum" are acceptable within these specifications:

1. Overall length	(Maximum)	30 Feet
2. Overall width	(Minimum)	96 inches
3. Aisle width	(Minimum)	36 inches
4. Overall height	(Maximum)	120 inches
5. Ceiling height	(Minimum)	78 inches

21. WHEELS

- a. Wheels shall be six hole disc with ventilating holes. 8.15 x 20" hub plated type. The coach shall be equipped with dual rear wheels. Stationhouses and chainplates placed wheels are to be provided on all wheels. All wheels shall be interchanging.

b. Furnish one (1) spare wheel and tire with each coach.

- c. All tires shall be 8.15 x 20" tube type 10 ply rated bus type tires. Tires shall be first line, top grade heavy duty, steel belted radial Michelin tires or approved equal. All wheels and tires shall be spin balanced and counterweighted as necessary.

22. EXHAUST SYSTEM

- a. Furnish aluminized steel muffler.
- b. Muffler shall be of minimum diameter of 10" and minimum length of 24" with three (3) pass chamber.
- c. The exhaust pipe shall terminate below the rear bumper and be so constructed that it will not cause back pressure in the motor or damage the engine and shall be anchored as near the end of the exhaust line as possible. The exhaust shall be directed rearward on a plane parallel to the road surface. Flexible tubing will not be permitted in the exhaust system.

23. TRANSMISSION

- a. Transmission shall be Heavy duty Allison automatic transmission Model No. 340 or approved equal, as Manufactured by Detroit Diesel Allison, a Division of G.M.
- b. Transmission shall be so constructed and adjusted as to provide a soft, no-jar action during shifting.
- c. The transmission oil shall be cooled by means of a heat exchanger.

24. DRIVE SHAFT

- a. Drive shaft shall be one piece torque tube with a slip spline and of such length not requiring midship bearings.

25. FUEL SYSTEM

- a. Engine shall be LPG fueled, and shall have a minimum displacement of 390 cubic inches. A factory LPG fuel conversion system is preferred. In event factory conversion is not available, LPG fuel system shall be Impco Model 475 M carburetion with Impco Model EXP vaporizer and regulator. Fuel lock and filter shall have bulbhead installation and filter shall be Impco Model VP250. Fuel lock and filter shall be stainless steel, wire braid hose. All fuel lines shall be stainless steel, wire braid hose. Fuel filter shall be U. L. approved. Engine shall be installed so that all routine service points are readily accessible. Engine compartment must be sufficiently sealed and insulated to prevent heat and fumes from entering coach. All component parts of the engine including the carburetor, the manifold, etc., shall be designed and built specifically for economical and efficient consumption of LPG fuel that meets the LPG industries high standards (i.e., specification RD5).

- b. LPG fuel tank shall have 95 gallon water rated capacity with minimum strength of 250 P.S.I. Tank construction must meet A.S.M.E. Motor Fuel specifications and include Signal Gauge. Tank must be installed in safe place with due regard to areas where highest incidence of hazard occur. Installation shall be approved by Purchaser. All buses shall be capable of being completely fueled from one fill intake receptacle. COOLING SYSTEM

26.

- a. Provide a minimum of 40 quart capacity system.
- b. A surge tank of at least 4 quart capacity shall be provided, mounted in radiator's top tank.
- c. Provide vents to top of surge tank at all possible air traps.
- d. Radiator shall be mounted in engine compartment, adjacent to engine, and to be so installed as to provide easy access for servicing.

27. BODY AND CHASSIS

- a. The underframe shall be constructed of minimum 10 gauge steel channel. Side posts shall be minimum 16 gauge steel with minimum 18 gauge steel roof carlines. All members shall be welded and gusseted below and above window lines in as to provide a complete integral coach.
- b. Panels shall be riveted to the steel structure in such manner as to prevent electrolytic corrosion.
- c. The coach structure shall be so designed as to prevent uneven loading of the outer panels.

- d. The structure shall be designed so as to prevent the accumulation or entrapment of moisture within the body panels.
- e. All exterior panels shall be of aluminum, of the following minimum thickness: 0.05 between the wheels and on the front and rear of the coach; 0.03 on the roof. To facilitate manufacturing, molded fiberglass panels will be permissible in some areas as recommended by the manufacturer.
- f. Centers of rivet lines on all outside panels shall not exceed 2 1/2", spacing of all posts not to exceed 24".
- g. All interior lining of the coach, between the window frames and below windows, shall be with 0.040 aluminum and shall be applied sectionally and measured to assure a neat and lasting finish. Ceiling lining to be aluminum or approved equal.
- h. Carpeting shall be installed on the interior side wall below the windows and over inside of the rear engine compartment. Samples and colors to be supplied by successful bidder.

28. SEALING AND INSULATION

- a. All panel joints shall be lapped and double riveted with an application of caulkant inhibiting sealer between the surfaces. Windows shall have rubber stripping.
- b. Roof and sidewall areas, together with the engine seat and risers shall be fully insulated. Fiberglass, urethane foam or other approved material may be used if the heat conduction rate and noise absorption qualities are equal to those provided by fiberglass blankets of 1.08 pounds density, used in the following thicknesses:

Roof: 1 1/2 inches

Sidewalls: 3/4 inches

Seat and Risers: 1 1/2 inches

29. FLOORS AND COVERING

- a. The plywood used for flooring shall be 3/4" marine grade, waterproof type with sealed edges. Floor shall be laid in such manner as to be free from squeals.
- b. The floor shall be level throughout and all joints between the floor and vertical sides shall be protected to prevent the entry of water and dirt.
- c. Floor covering to be 5/16" ribbed in step area; 3/16" ribbed on aisles; 3/32 smooth under seats.
- d. Material for floor covering shall be RCA Plex-I-Floor, or equal, color to be finished to successful bidder.
- e. Provide a metal strip around each wheelhousing to seal the floor covering to wheelhouse.

30. DOORS

- a. Doors shall be air operated with individual motors located above each door.
- b. The rear exit door shall contain a brake interlock.
- c. Provide safety edges on both front and rear doors.
- d. Door openings to be minimum of 79" in height with 29 3/4" openings.
- e. Door operation shall be air controlled with a five-way valve which shall conform to Transit Industry standards.
- f. Provide separate circuit breaker emergency switch for rear door to prevent use, if desired.

31. STEPS AND WHEELHOUSES

- a. Provide 3 steps from ground level to floor.
- b. First step shall not exceed 14" from ground.
- c. Provide white safety nosing on all entrance and exit steps.
- d. To be corrosion-resistant reinforced molded fiberglass construction. Mud-flaps to be installed behind all wheels.

32. WINDOWS

- a. Windows shall be of manufacturer's standard design.
- b. Side windows shall be of the emergency push out design and be glass of single density, safety sheet.
- c. All windows to be light-tinted glass-minimum of 30% tint.

33. WINDSHIELD

- a. The windshield shall be 1/4", safety plate which shall be heat absorbing and glare reducing.
- b. It shall be rubber mounted and shall meet SAE standards.
- c. The top portion of the windshield shall be heavily tinted (minimum 70% tint) approximately 8" wide.

34. DRIVER'S SEAT

- a. The drivers seat shall be Heywood Whitefield model 235-S or equal.
- b. Seat back to be leather patterned, anodized aluminum back to match passenger seats.
- c. Seat cushion to be foam rubber, covered with same materials and colors as determined under Item 19, Para. (b).

35. WINDSHIELD WIPERS

- a. Two-speed electric operated wipers as approved by purchaser may be provided. Wiper motors to be mounted for uncluttered appearance and to provide maximum visibility. Two air operated heavy duty Spreuer Super Challenger, or approved equal, windshield wipers of self-parking type with individual control for each wiper shall be provided.
- b. Springs, or approved equal, air push windshield washers shall be provided.
- c. Defroster with screened opening shall be provided so that entire windshield will be kept free from frost or fog.
- d. If applicable, wiper motors shall be piped so that air will exhaust below floor.

36. BUMPERS

- a. The front and rear bumpers shall be at least 7 1/4 inches high and shall be installed so as to adequately protect the vehicle. Bumpers must extend beyond a projected vertical line of all body panels, lights, and windshield wipers. Bumpers shall have a bright metal finish. Rubberized bumper bars to cushion impact and to function as an anti-climb feature shall be provided. Tow eyes shall be provided at the front bumper mounted to the frame.

37. HORN

- a. Provide dual 12 volt electric horns. Also, a pleasant sounding bell, which acoustically simulated on simulated, shall be controlled by a switch readily accessible to the driver as an alternative to using his horn.

38. SAFETY SHIELDS AND MODESTY PANEL

- a. Install safety shield to rear of entrance door to prevent passenger from placing arm between grab rail and door-open position.

39. INSIDE CARD PADS

- a. Install standard 11" card retainers on both sides of the coach above windows.

40. PASSENGER SIGNAL SYSTEM

- a. Provide single note stop chime. Cords to run full length of each side over passenger area and to be of plastic covered steel.

41. PAINTING

- a. Exterior and interior painting shall be of colors to be in accordance with drawings and charta furnished to the GLPTC for approval by the successful bidder.
- b. Exterior surface shall be two (2) coats synthetic baked enamel, applied over a suitable primer, colors not to exceed three. All metal and wood must be properly cleaned before first paint application. All metal to metal joints must be properly primed.

c. Inside finish shall consist of primer and finish coat. Interior finish to be two (2) color minimum, determination of colors to be in accordance with paragraph "a".

42. LETTERING

- a. GLPTC coach number to be in accordance with GLPTC supplied information.
- b. Apply coach numbers as applicable, to four positions on each coach using any one of 3" numbers. Location of letters to be furnished to successful bidder.

43. AIR CONDITIONING EQUIPMENT

- a. The condenser-evaporator combination to be Thermo King Model B-1-M6 (or approved equal system with a minimum of 4 ton capacity and a minimum of 45,000 BTU/Hrs) mounted at the top rear with a cover styled to blend with the exterior lines of the coach, and adding only approximately 10 inches to the overall height.
- b. Two blowers circulate the conditioned air through full length slotted ducts located above the windows on each side of the passenger compartment. Dual rows of slots distribute air across the ceiling and down the sidewalls to provide uniform cooling without drafts. The wireless blower fan shall have 3 speeds. The blower system may also be used for ventilation without cooling, at the option of the driver. The ducts are to be designed to conform to the interior styling of the coach and will permit the use of advertising card retainers. The recirculated air is to be returned to the evaporator through a removable filter located in upper rear of the coach interior. A control thermostat is to be located behind the grill to avoid passenger tampering.
- c. Compression is accomplished by a Frigidaire Rotary Compressor (or approved equal) with a 12.6 cubic inch capacity. A 24 volt alternator, rated at 70 amperes and 24 volts, is to be used to supply power for the blower motors in the condenser-evaporator unit. Both the compressor and the alternator to be located in the engine compartment, adjacent to the coach engine, readily accessible for maintenance purposes.
- d. As an additional requirement the air conditioning system is to have a 24 volt battery system, in order to maintain a constant blower speed under city transit operating conditions, in which the engine is constantly being accelerated and decelerated and may idle for prolonged periods.
- e. A manually controlled high idle speed of from 1000 to 1200 RPM shall be provided in order to maintain the blower speed during low vehicle speeds. The entire air conditioning system is to be approved by the Purchaser.

44. FARE BOX

- a. To be Diamond model 2 (or approved equal) mounted on a fare station convenient to the driver with fare box light switch mounted on driver control panel. Three sets of box vaults shall be supplied for every coach fare station. The location of farebox and farebox stations shall be approved by purchaser.

45. EMERGENCY EQUIPMENT BOX

- a. An emergency equipment box shall be installed at the front of the bus. The box shall be equipped with standard emergency equipment including a first aid kit, 2 1/2 pound dry type fire extinguisher and fire axe. Installation of box and equipment shall be approved by Purchaser.

46. MISCELLANEOUS

- a. Bidders to supply as a separate item in the bid pricing for (2) two spare engine and transmission assembly mounted as a unit for replacement purposes.

- b. The contractor shall furnish copies of maintenance manuals and parts books covering all items on coach in sufficient number to supply the requirement of the GLPTC.

47. BIDDING PART OF COACH QUOTATION

- a. Bidders shall submit a letter, separate from bid, indicating list of spare units recommended for the number of coaches covered by these specifications, together with current prices.

Note...These units are not to be part of the "Request for Quotations," for the coaches covered by these specifications.

- b. Prices for these units must be for units identical to those covered in these specifications. Each unit shall be identified by part number and sufficient added description to enable the ordering of units identical to those used in the specifications.

- c. The letter shall indicate the length of time the quotations will remain firm.

48. UNDERCOATING

- a. The entire underside of the bus shall be sealed and coated with a suitable undercoating material. Drain tube openings, and mechanical components whose operation or inspection would be adversely affected, must not be coated.

49. RADIO EQUIPMENT

- a. Each bus shall be equipped with an Audiovox Model C975, AM-FM radio and 8 track stereo tape deck combination or approved equal. Purchaser shall approve installation location of all radio equipment.

50. LIQUID PROPANE GAS SAFETY

- a. All LP-Gas related equipment must conform to the National Fire Protection Association pamphlet Number 35 and the United States Department of Transportation specification 48-240.
- b. LP-Gas tanks shall include a safety device that makes it impossible to fill fuel tanks to over 85% of the fuel tanks water rated capacity. The overflow safety device shall be a positive mechanical shut-off type.

Appendix H

Contained in this appendix are two of the fourteen alternative transit systems that were developed in the Greater Lafayette Area Bus Transit Study.¹⁵ The examples are provided to show how alternatives might be developed and the information that might be provided.

Alternative No. 6

System: Six 18-23 passenger air-conditioned buses, one 45 passenger air-conditioned bus, seven 12 passenger air-conditioned buses.

Routes, Schedules: Operations during peak hours (see "Peak Hours on Existing Routes") will be on the existing four routes (Figure 10-1). Headways during peak hours will be the same as those presently existing with 30 minute headways on the Fairpark-Union and Monon-University routes and 60 minute headways on the South Street-Salisbury and the Kossuth-Purdue Airport routes.

Operation during off peak hours will be demand-responsive, that is the buses on duty will respond to a telephoned request for service with the telephoned request handled through a dispatcher. There would be no fixed routes or schedules during this period.

Seven buses will operate during off peak. Two buses will operate before 6:00 a.m. During 9:00 a.m. to 3:00 p.m. seven buses will operate. During 6:00 p.m. until 8:00 p.m. three will operate. 8:00 p.m. to 11:00 p.m. two buses will operate.

Estimated Costs:

Vehicle Operating Cost:

Peak hours: Assume operation from 6:30-9:00 a.m. and 3:00-5:30 p.m. on all routes except Monon-University where the peak will be 6:30-9:00 a.m. and 1:00-5:30 p.m.

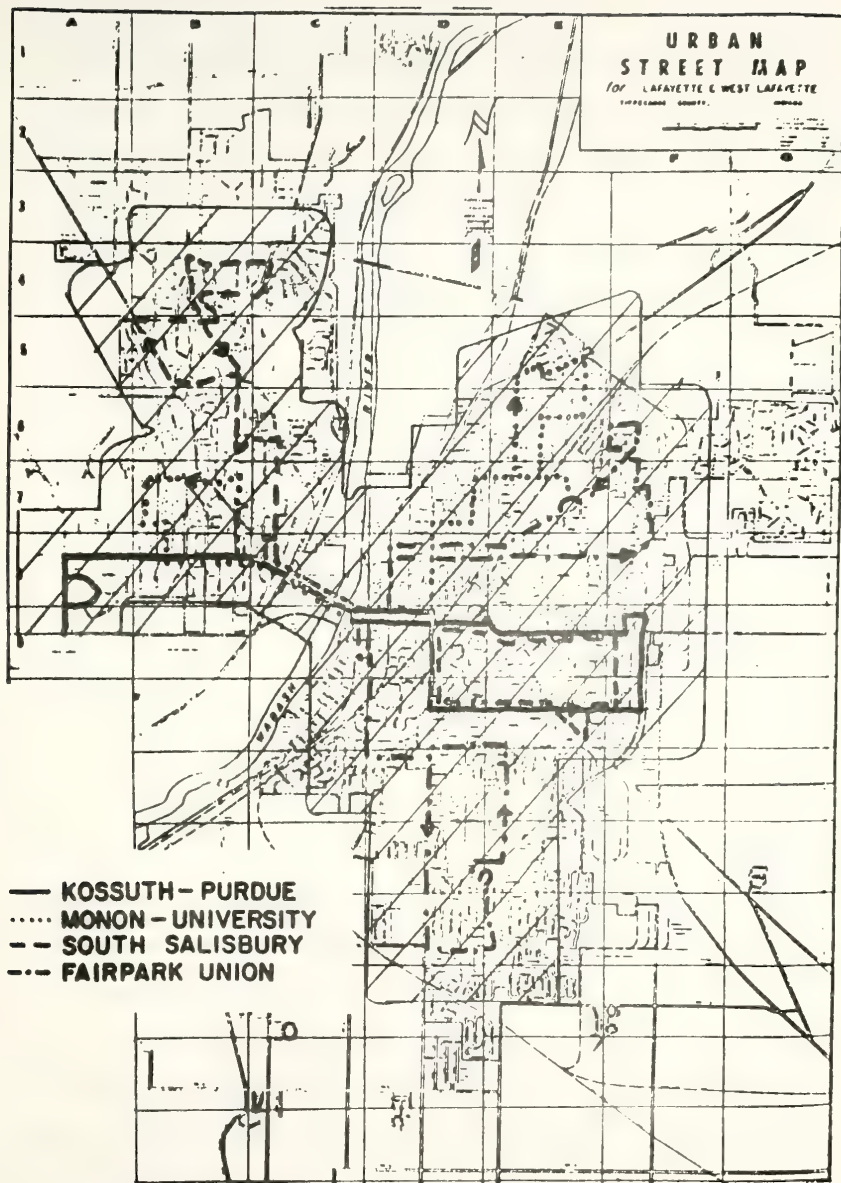


FIGURE 10-1

PRESENTLY SCHEDULED BUS ROUTES

Peak Hours:

[(Fairpark-Union - 11.9 mile route x 2 buses x
 5 trips) + (South Street-Salisbury - 12.4 mile
 route x 1 bus x 5 trips) + (Kossuth-Purdue Airport -
 10.5 mile route x 1 bus x 5 trips) + (Monon-
 University - 9.6 mile route x 2 buses x 7 trips)] x
 \$.07/mile = \$25.75/day; \$25.75/day x 6 days x
 52 weeks = \$ 8,034.94

Off Peak Hours:

[(7 buses x 12 miles per hour x 7 hours) +
 (3 buses x 12 miles per hour x 3 hours) +
 (2 buses x 12 miles per hour x 5 hours)] x
 \$.07/mile = \$57.12; \$57.12/day x 6 days x
 52 weeks = 17,821.44

***Drivers Salaries:**

113 driver hours per day x 6 days x 52 weeks x
 \$3.45/hour = 121,633.20

Operating Expenses: 58,500.00

Dispatcher: 10,800.00

Capital Recovery Cost for Facilities: 11,300.00

Capital Recovery Cost for Vehicles:

(6 buses @ \$13,152) + (1 bus @ \$36,000) +
 (7 buses @ \$8,000); (\$78,912 x .21632) +
 (\$36,000 x .14903) + (\$56,000 x .38803) = 44,165.00

Capital Recovery Cost - Radios, Fare Boxes:

(14 Radios @ \$500.00)+(\$1,500 Base Station) +
 (14 Fare Boxes @ \$220.00); \$11,580 x .14903 = 1,725.77

Yearly Radio Maintenance: 10% x \$8,500 =	<u>850.00</u>
Total System Cost (per year)	\$274,830.35

*Includes 15% for vacation, sick leave, F.I.C.A., unemployment, hospitalization, etc.

This alternative utilizes six medium size buses and seven mini buses. The operation is on fixed routes and schedules now existing during the peak hours and a "demand-responsive" system at all other periods. The "demand" for service will be by phone through a dispatcher. The level of service will be considerably higher than present but the cost is also proportionately higher. The fare necessary to support the total annual cost from the fare box is \$.58. The fare to support the annual operating cost from the fare box is \$.49 assuming ridership remains the same as the present.

Alternative No. 14

System: Twelve 33 passenger air-conditioned buses, one 45 passenger air-conditioned bus.

Routes, Schedules: Seven fixed routes radiating from downtown Lafayette are shown in Figure 10-3. This is the result of combining and extending existing routes to more effectively use equipment. Although this alternative requires twelve buses, it has the best coverage and 20 minute service to most incorporated areas. The present Monon-University route will be expanded to include Purdue Airport and provide 20 minute headways. This results in an elimination of the need for the old Purdue Route.

The Union Street Route is expanded to extend out Greenbush to the Green Acres Apartment area. The Fairpark-Union route is changed to provide two way service on Ninth Street including Central Catholic High School and the Norma Jean Subdivision. Twenty minute service is provided. The Salisbury route is improved and expanded with 20 minute headways. The route includes major apartment complexes and Purdue University. The route uses the Harrison Bridge to reduce travel time to downtown Lafayette. The South Street route is modified and extended to K-Mart. It has 40 minute headways.

The Kossuth route is dropped, completely eliminating the old Purdue Kossuth Route. Two way service is

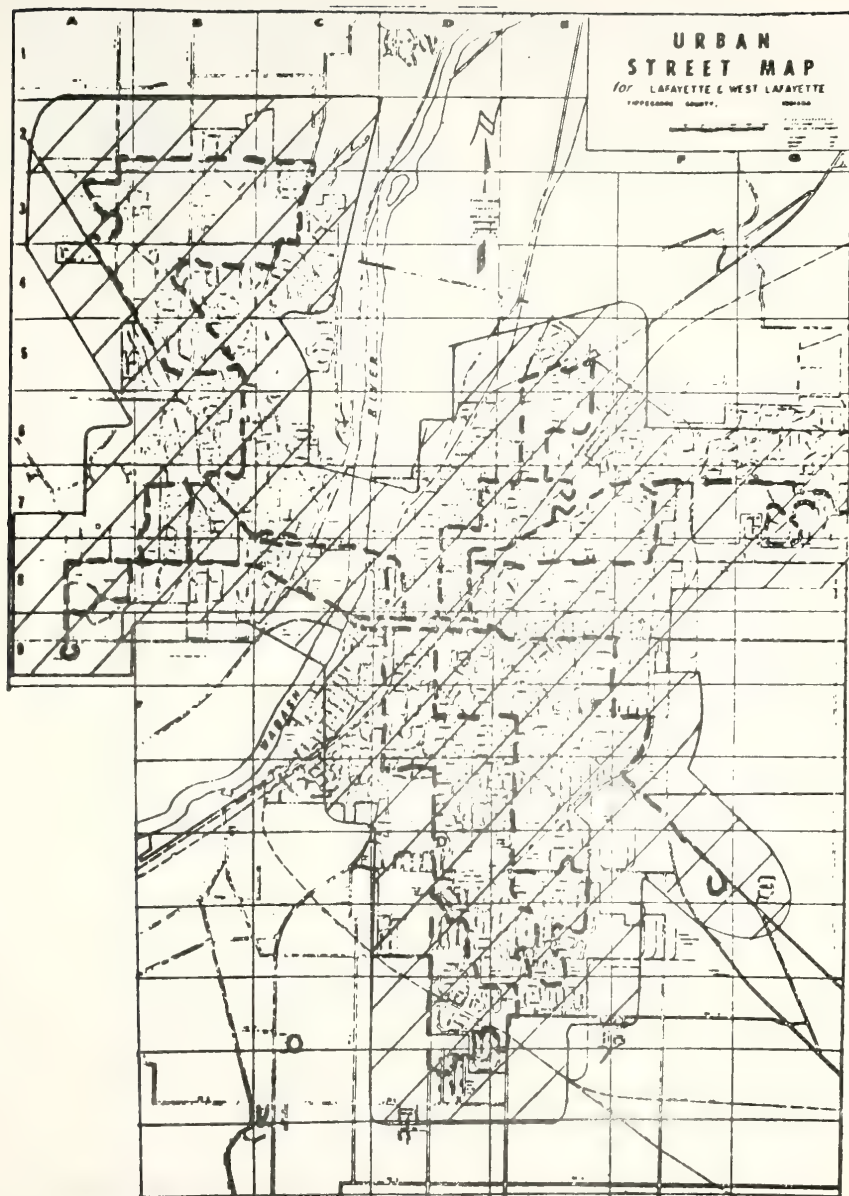


FIGURE 10-3

SEVEN PROPOSED ROUTES FOR EXTENDED AREA COVERAGE

High School, Tecumseh Addition, and Woolco. Forty
minute service is provided.

Estimated Cost:

Vehicle Operating Cost:

4 Buses - Monon-University:

324 route miles per day x 6 days x 52 weeks

x \$.12/mile = \$12,230.56

4 Buses - Salisbury-K-Mart-Woolco:

432 route miles per day x 6 days x 52 weeks

x \$.12/mile = 16,174.08

4 Buses - Greenbush-South 9th Street:

410 route miles per day x 6 days x 52 weeks

x \$.12/mile = 15,350.40

*Drivers Salaries:

12 buses x 16 hours per day x 6 days x 52 weeks

x \$3.45/hour = 206,668.80

Operating Expenses: 58,500.00

Capital Recovery Cost for Facilities: 11,300.00

Capital Recovery Cost for Vehicles:

(12 buses @ \$26,500)+(1 bus @ \$36,000);

\$354,000 x .14903 = 52,756.62

Capital Recovery Cost - Radios, Fare Boxes:

(13 Radios x \$500.00)+(\$1,500 Base Station) +

(13 Fare Boxes x \$220.00) = \$10,860 x .14903 = 1,618.47

Yearly Radio Maintenance: 10% of \$8,000 = 800.00

Total System cost (per year) \$375,398.93

*Includes 15% for vacation, sick leave, F.I.C.A., unemployment
hospitalization, etc.

The system utilizes twelve full size buses to greatly increase the area served and the level of service.

The total annual system cost is approximately \$375,000.00. To support this system entirely from the fare box would require a fare of \$.88. To support the annual operating cost from the fare box would require a fare of \$.72 assuming present level of ridership is continued.

Appendix I

Contained in this appendix is the preliminary UMTA Grant application from the Lafayette study.¹⁶ This information is provided to show the amount of information required as well as the detail necessary for each part of the application. The appendices to the preliminary application have been omitted.



GREATER LAFAYETTE PUBLIC TRANSPORTATION CORPORATION
324 Ferry Street, Room 201
Lafayette, Indiana 47901

BOARD OF DIRECTORS
Kenneth W. Heathington, Chairman

William S. Friesmeyer, Secretary
Charles E. Smith, Treasurer
John B. Carter, Director
Gerald A. Lusk, Director
Clifford P. Langley, Director
James R. Williams, Director

Urban Mass Transportation Administration
U.S. Department of Transportation
Washington, D. C. 20590

Gentlemen:

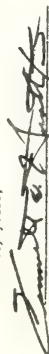
The Greater Lafayette Public Transportation Corporation applies for a grant of \$834,900.00 under the Urban Mass Transportation Assistance Act of 1970 to assist in financing a capital improvement project generally described as:

- (a) Purchase of (1) 15 new medium size (20 to 33 passenger) air conditioned diesel, gasoline or propane transit buses; (2) 10 new mini size (12 passenger) air conditioned gasoline buses and (3) one 3/4 ton pick-up truck.
- (b) Purchase of land for and construction of a new transit terminal to include an office, maintenance facilities and bus storage facilities for the Greater Lafayette Public Transportation Corporation.

The sections that follow describe in more detail the proposed capital improvement project.

The applicant represents that the data submitted to the Department of Transportation in support of this application are true and correct.

Sincerely yours,



Kenneth W. Heathington, Ph.D. P.E.
Chairman of the Board of Directors of
Greater Lafayette Public
Transportation Corporation

1. Description and estimated cost for capital facilities to be acquired by the Greater Lafayette Public Transportation Corporation through the proposed DOT Urban Mass Transportation Administration capital grant.

A. Rolling Stock

15 Medium Size Buses - 20 to 33 passenger, diesel, gasoline or propane engine, air conditioned @ \$30,000-----	\$450,000
10 Mini Buses - 12 passenger, gasoline engine, air conditioned @ \$8,000-----	80,000
One 3/4 ton pick-up truck @ \$3,000-----	3,000
Total Cost Rolling Stock-----	\$533,000

B. Radios and Fare Boxes

26 Radios @ \$1,100 per unit, base station, antenna, and remote line-----	\$35,500
25 Fare Boxes @ \$500-----	12,500
Total Cost Radios and Fare Boxes-----	\$48,000

C. Terminal - Land, Buildings, Equipment

(1) Land and Utilities	
Land 5 acres @ \$20,000/acre-----	\$100,000
Utility adjustments-----	5,000
Total Cost Land and Utilities-----	\$105,000

(2) Buildings - Offices, Maintenance Facility, Bus Storage Facilities, and Sitenwork

Offices and Maintenance Facility, 4500 sq. ft. @ \$22/sq. ft.-----	\$99,000
2 Bus Shelters each 80' x 120' @ \$10/sq. ft.-----	192,000

Sitenwork including paving, fence, landscaping-----	80,000
Total Buildings and Sitenwork-----	\$371,000

(3) Terminal Equipment

Automatic Bus Washer-----	\$16,000
Automatic Cyclone Cleaner-----	12,000
Hoists-----	12,000
Gasoline and Diesel Oil Storage Tanks (10,000 Gallon each), 2 pumps and installation-----	16,000
Miscellaneous Maintenance Equipment-----	10,000
Remotely Operated Terminal-----	15,000
Office Furniture-----	5,000
Change Counter-----	2,000
Total Cost Terminal Equipment-----	\$76,500

Total Cost Terminal Including Land,
Buildings, and Equipment-----\$552,500

D. Downtown Bus Shelters

Total Cost Downtown Bus Shelters-----\$ 5,000
SUB-TOTAL-----\$1,138,500
10% Contingency-----113,850
TOTAL COST-----\$1,252,350

TOTAL COST CAPITAL FACILITIES \$1,252,350

2. Description of transportation system in which the facilities and equipment will be used.

The Greater Lafayette Area is a small metropolis made up of two core cities, Lafayette founded in 1825 and West Lafayette, founded in 1845. The surrounding developing area is in Tippecanoe County which was established in 1826. The Greater Lafayette Area is located a third of the way from Indianapolis to Chicago on Interstate 65. It is served by three railroads: the Norfolk and Western, Penn-Central, and the Monon. Two of the Amtrak passenger routes make stops in Lafayette: Chicago-Cincinnati and Chicago-Miami. Two airlines, Allegheny, and Air Wisconsin, serve the area from Purdue Airport.

The population of the Lafayette Standard Metropolitan Statistical Area (which includes all of Tippecanoe County) was 109,378 in 1970 and is projected to 150,000 by 1990. It has been a rapidly growing area since 1960. Although part of this growth is the result of the continuing growth of Purdue University, which once was the dominant employer, most of the new and projected growth is expected to be the result of continued and accelerating growth in industry and commerce.

About 42,000 people are employed in the area, 9,300 of them in local industry. The major industries include Alcoa, National Homes, Anheuser-Busch, General Foods, Fairfield Manufacturing, Eli Lilly, Berger Steel, Ross Gear & Tool Company, Rostone Corporation, and Malston-Purina. There are also a host of smaller industries, many of which are located in the Purdue Research Industrial Park.

In addition to being a market center for a rich agricultural hinterland, the Greater Lafayette Area is becoming an important banking and financial center. The three full-service banks have combined assets of about \$235,000,000, and the Lafayette Life Insurance Company has assets of about \$90,000,000. There are also many other financial institutions including savings banks, credit unions, and loan companies.

Commercial areas and shopping centers include such major department store chains as Sears Roebuck, Ayres, K-Mart, Woolco, Grants, and Zayres, and soon will include Montgomery Ward.

The Greater Lafayette Area is a major stop for auto trips between Indianapolis and Chicago. As a result it has built up a major auto-service complex of restaurants and motels. A second set of auto-service complexes are either being planned or under construction around the several I-65 interchanges serving the community.

Public transportation has played a role in the development of the Greater Lafayette Area for over 100 years beginning shortly after the Civil War in 1869. The first system consisted of a mule drawn railway which lasted only a few years. The first "bus" was an Omnibus, a horse drawn heavy Coach, seating 12 passengers. The first electric street

cars began service in 1888. Buses took over the entire public transportation service in 1940.

The public transportation system in the Greater Lafayette Area from its inception until August 14, 1970 was provided by various privately owned companies. In 1970 the Greater Lafayette Bus Company, Inc., a privately owned company, informed the cities of Lafayette and West Lafayette that it was going to cease providing public transportation service on July 1, 1970 because it was no longer profitable to operate the service.

The two cities, agreeing that public transportation service was a necessity in the Greater Lafayette Area, decided to purchase the franchise and equipment from the private bus company. The purchase price was \$25,000.00 with 70% paid by the City of Lafayette and 30% paid by the City of West Lafayette. The cities took over the operation on August 14, 1970.

The cities asked Purdue University to make a study of the public transportation system and to make recommendations as to what should be done concerning public transportation. Purdue University through the School of Civil Engineering Joint Highway Research Project accepted the task and the report "The Greater Lafayette Area Bus Transit Study" (Appendix A) was prepared. Among the recommendations made in the report was the recommendation that a transit authority with taxing power be established under the State of Indiana enabling legislation entitled the Urban Masses Transported on Act of 1955 (S.B. 474) (Appendix B). In July, 1971 the two cities entered into an agreement (Appendix C) establishing the Greater Lafayette Public Transportation Corporation. The Corporation assumed control of the public transportation system September 1, 1971.

PRESENT SERVICE AND FACILITIES

The Greater Lafayette Public Transportation Corporation provides the only mass transportation in the Greater Lafayette Area. The presently scheduled bus routes cover the area of Lafayette as shown in Figure 1. Forty-four and 1/3 route miles are provided. Areas within 1/4 mile of a bus route are shown by a cross hatched symbol. The schedules provide for a headway of one hour on two routes (South Street-Salisbury, Kosau-Purdue) and thirty minutes on two routes (Monon-Shops-University, Fairpark-Union). All routes intersect at their half-way points at the Court House to allow transfers.

The Fairpark-Union route is essentially a north-south route which serves the Tecumseh Addition, Jefferson Square shopping center, the downtown area, St. Elizabeth Hospital, Market Square shopping center and portions of the northeast Lafayette residential area. Two buses are used on this route providing half hour headways. Hours of operation are from 5:46 A.M. to 6:15 P.M. (EST).

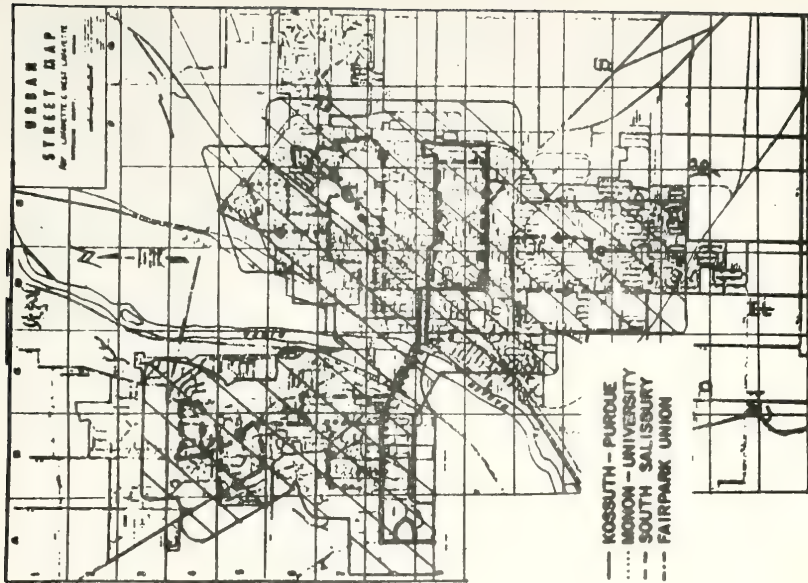


FIGURE 1

LEGEND: ROUTES AND AREAS

The Monon Shops-University line serves the northwest residential area of Lafayette, Market Square shopping center, the downtown area, and Purdue University. Two buses are used on the route providing half hour headways. Hours of operation are 5:45 A.M. to 11:10 P.M. (EST).

The South Street-Salisbury line serves Wabash Village and the residential areas of West Lafayette, the downtown area of Lafayette, South Street including Penn Hospital, 29th Street, and Kosuth Street. One bus is used on the route providing one hour headways. Hours of operation are 5:45 A.M. to 6:15 P.M. (EST).

Kosuth-Purdue Airport corresponds closely to the South Street-Salisbury route in Lafayette; it also serves the Purdue Campus and the Purdue Airport. One bus is used on this route resulting in one hour headway. Hours of operation are 6:15 A.M. to 9:40 P.M. (EST).

The fares charged are 30 cents per ride for adults and 20 cents for students of high school age and younger.

Table 1 presents revenue data and number of passengers carried for the years 1966 through August 31, 1971. The maximum number of passengers carried (714,971) occurred in 1967. The ridership has declined since 1967. During the period August 14, 1970 (date City took over the operation) to August 31, 1971 (date Transit Authority assumed the operation) 363,312 revenue passengers were carried. For this period the total operating revenues were \$159,269.89 and the total operating expenses were \$200,763.45 for a net operating loss of \$41,493.56.

TABLE 1

	1970	1969	1968	1967	1966
Passenger Revenue	\$169,563.90	\$187,805.70	\$197,371.82	\$200,191.06	\$191,509.67
Number of Passengers (using average rate of 76¢)	532,518	670,735	705,616	714,971	685,035
Special and Charities	22,181.74	14,655.40	15,748.43	16,389.42	21,028.15
Other Operating Revenue	3,120.65	4,102.29	4,170.58	4,167.90	3,622.78
Total Operating Revenue	194,866.29	206,563.39	217,290.83	220,749.38	216,160.60

August 14, 1970 to August 31, 1971 (one year plus 18 days)
(On August 14, 1970 cities of Lafayette and West Lafayette assumed operation from private operator)

OPERATING REVENUE AND EXPENSES

Passenger Revenue	\$101,727.72	NUMBER OF REVENUE PASSENGERS CARRIED
Charter Revenue	11,578.75	15700 AVERAGE PAID OF \$7.13
School Charter Revenue	42,632.39	
Other Revenues	3,211.03	363,312
Total Operating Revenue	\$159,269.89	
Total Operating Expenses	\$200,763.45	
NET OPERATING LOSS	\$41,493.56	

The rolling stock for the bus system includes 33 buses and one pickup truck. A list of the buses is included in Appendix D. The buses range in capacity from 36 to 45 passengers. The average age of the buses is 21 years. Most of the buses are in poor condition with a few in fair condition. Several, including the only bus that is less than 15 years old, are not in operating condition.

The present terminal facility is rented on a month to month basis. It is a 100' x 130' brick structure built in 1895. The bus storage and repair facility lacks an exhaust system and a tire repair and storage area. The one repair pit provided does not meet safety specifications. Office space, parts storage area, and locker room facilities are inadequate. There is not enough room within the terminal area to allow the maintenance personnel to maneuver the buses for routine nightly cleaning and maintenance and to store the buses. Buses must be parked on the city streets adjacent to the bus barn.

PROPOSED SERVICE AND FACILITIES

The proposed service to be implemented using the facilities proposed in this capital grant application is a combination and modification of several alternatives outlined in the Greater Lafayette Area Bus Transit Study and is described below.

The system includes fifteen 20 to 33 passenger air-conditioned buses, ten 12 passenger air-conditioned buses, two way radio communication systems for all buses, new terminal facilities on five acres of land including office space, maintenance garage, bus storage facilities, and automatic service line facility consisting of fueling facility, safety check, automatic cyclone cleaner and automatic washer facility.

Operations during peak hours are on seven fixed routes radiating from downtown Lafayette as shown in Figure 2. Route mileage totals 51.3 miles. This is the result of combination and extending existing routes to more effectively use equipment. Although this alternative requires fourteen buses, it has very good coverage and 20 minute headways in most incorporated areas.

The present Monon-University route will be expanded to include Purdue Airport and provide 20 minute headways. This results in an elimination of the need for the old Purdue Route.

The Union Street Route is expanded to extend out Greenbush to the Green Acres Apartment area. The Fairpark-Union route is changed to provide two way service on Ninth Street including Central Catholic High School and the Norma Jean Subdivision. Twenty minute service is provided.

The Salisbury route is improved and expanded with 20 minute headways. The route includes major apartment complexes and Purdue University. The route uses the Harrison Bridge to reduce travel time to downtown Lafayette.

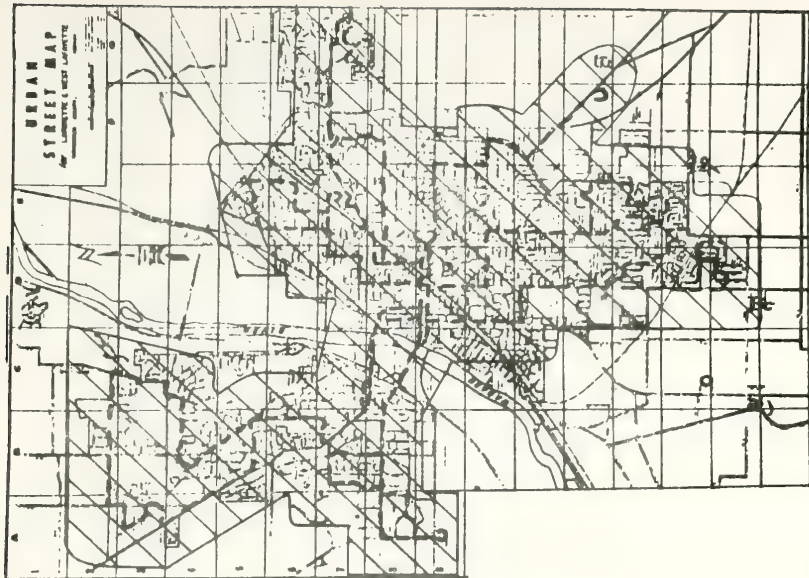


FIGURE 2

SYSTEM PROPOSED ROUTES FOR EXTENDED AREA COVERAGE

The South Street route is modified and extended to K-Mart. It has 20 minute headways.

The Kossuth route is dropped, completely eliminating the old Purdue Kossuth Route. Two way service is provided on a new route on 18th Street to Jefferson High School, Tecumseh Addition, and Woolco. Twenty minute service is provided.

Operation during off peak hours will be demand-responsive, that is the buses on duty will respond to a telephoned request for service with fixed routes or schedules during this period. There would be no during off peak hours. Three buses will operate before 6:00 A.M. During 9:00 A.M. to 3:00 P.M. ten buses will operate. During 6:00 P.M. until 8:00 P.M. four or more will operate depending upon the demand. 8:00 P.M. to 11:00 P.M. three or more buses will operate, again depending upon the demand. Proposed fares for fixed route, fixed schedule service are 30c for adults and 20c for children of elementary and secondary school age. Fares for the demand responsive service will be higher with the specific fare yet to be determined.

3. Describe the benefits to be derived from the facilities and equipment, and relate these benefits to the transportation program for the urban area.

The equipment and facilities presently available to the Greater Lafayette Public Transportation Corporation are obsolete, substandard, unsafe, undesirable, and discourage ridership. The buses are practically impossible to maintain in acceptable working condition and are polluting the environment. It is imperative that new rolling stock and maintenance facilities be obtained so as to provide reliable, dependable, safe and attractive public transportation service.

The present service is not capable of meeting the minimum demands for service from those who are dependent (captive) on the public transit operation in the Greater Lafayette Area. In fact, at times when a bus breaks down and because no replacement bus is available, service is disrupted to a point where no service is provided on certain routes during the day. These persons numbering approximately 1,000 on a typical week day (in November, 1970 the date of the on-board bus transit survey) are the young, the elderly, the lower economic class owning no automobiles, those families where only one automobile is available to them, and those who for one reason or another are unable to provide or obtain an automobile for their transportation needs.

The proposed system of new buses with a much improved level of service with better service coverage, reduced headways and demand responsive service during off peak periods during the day will allow the Greater Lafayette Public Transportation Corporation to provide safe, dependable, reliable, coordinated, attractive, convenient service to those who have no choice but to ride public transit. It will also provide a meaningful alternative to those in the metropolitan area who have automobiles of their own. The proposed system will provide a choice of modes of public transportation. The hope is that with a modern public transit system providing a high level of service including demand responsive service, a number of persons presently driving automobiles will use transit thus relieving, to some extent, the congestion in parking areas in the downtown area and on the Purdue Campus. Perhaps, with an adequate public transportation system, a number of families will re-examine the decision that has been made to own and use two or more automobiles thus reducing the growth rate of automobile ownership in the Greater Lafayette Area.

4. Estimate total cost of the project. (See Section 1)

5-6. Estimate what portion of the total cost of the project can be financed from revenues; identify the source of the revenues and indicate how such financing will be arranged.

Estimate what portion of the total cost cannot be reasonably financed from revenues and indicate how the local share (at least 1/3 or 1/2) will be secured.

The present bus fleet is, as previously outlined, very old and does not have any resale value other than junk prices and it may be that the Greater Lafayette Public Transportation Corporation may have to pay someone to take the old buses. Approximately 10 of the best old buses will be retained to provide for the school charter contracts that the Greater Lafayette Public Transportation Corporation presently has with the Jefferson High School in Lafayette.

None of the total cost of the project can be financed from revenues from the fare box or from the proceeds of the facilities to be replaced.

The Lafayette City Bus Company from August 14, 1970 (date Cities of Lafayette and West Lafayette took over operation from the privately owned Greater Lafayette Bus Company) to August 31, 1971 (date the Greater Lafayette Public Transportation Corporation assumed control of the bus operation) had an excess of operating expenses over operating revenue, or a deficit of \$41,453.36. This operating revenue included fare box receipts, school charter service and charter service. A statement of income and expenses for this time period is included in Appendix F.

Since the Greater Lafayette Public Transportation Corporation assumed control of the transit operation, the expenses have exceeded the income by \$18,695.07 for the period September 1, 1971 to October 31, 1971.

The local share of the total cost of the project (1/2 temporarily until the Greater Lafayette Area Transportation and Development Study completes the transportation plan for the area) will be secured by either borrowing the funds from local banks (letter of intent to loan included in Appendix F) or selling bonds, and repaying the loan or bonds from taxes raised by the Greater Lafayette Public Transportation Corporation under its taxing powers given to it by the State of Indiana in the Urban Mass Transportation Act of 1965 (see Appendix B). These taxes are also used to make up operating deficits.

7. Describe efforts made to obtain private revenue financing and any state or local actions which have been taken to provide financial or other assistance in the solution of urban mass transportation problems.

No efforts have been made to obtain private financing for the proposed capital improvements, other than the securing of letters of intent to loan money for the local share of a capital grant from U.M.T.A. The reasons are (1) the history of the bus operation is one of deficits where not even operating expenses, let alone capital improvements, have been met from the fare box; (2) although the Greater Lafayette Public Transportation Corporation has taxing powers, the pressures from the tax payer are to keep local taxes down and the raising of taxes to meet the local share of an U.M.T.A. capital grant, and the operating deficits of the transit service will politically be a task for the Transit Authority.

State action to provide financial assistance to local public transit service has been to pass enabling legislation (Urban Mass Transportation Act of 1965) allowing the establishment of local transit authorities with taxing powers to raise money locally to meet the needs for public transportation. Local action to provide financial assistance has been to use local municipal tax funds from the Cities of Lafayette and West Lafayette to purchase the assets and liabilities of the privately owned Greater Lafayette Bus Company, operate the transit service and make up operating deficits from municipal tax monies for over one year until the Greater Lafayette Public Transportation Corporation could be established and begin operation at which time the assets and liabilities of the Lafayette City Bus Company were given to the Greater Lafayette Public Transportation Corporation.

8. Describe the status of (a) comprehensive planning for the development of the urban area, and (b) transportation planning undertaken to provide the basic framework of the urban mass transportation system and highway network for the area and list the statewide, subregional and local agencies responsible for comprehensive and transportation planning, and the state and metropolitan or regional clearing houses notified of the application.

Comprehensive planning for the development of the urban area and transportation planning to provide the basic framework of the urban mass transportation system and the highway network for the Greater Lafayette Area are being done by the Greater Lafayette Area Transportation and Development Study as part of the Tippecanoe County Area Plan Commission. Plans are that the Study will be completed within the next two years.

The area wide, subregional and local agencies responsible for comprehensive and transportation planning are respectively The State of Indiana, Department of Commerce, Division of State Planning and The Tippecanoe County Area Plan Commission.

State and metropolitan or regional clearing houses notified of this application are The State of Indiana, Department of Commerce, Division of State Planning and The Tippecanoe County Area Plan Commission.

9. Describe the program which exists or is being developed for a unified or officially coordinated urban mass transportation system for the urban area.

All urban mass transportation systems for the urbanized areas are unified and coordinated under the authority of the Greater Lafayette Public Transportation Corporation which was established by a joint ordinance (Appendix C) of the cities of Lafayette and West Lafayette under the State of Indiana Statute 274 - Urban Mass Transportation Act of 1965 (Appendix B). The Mass Transit Authority includes all of the territory within the corporate limits of Lafayette and West Lafayette and territory which extends approximately two miles beyond the corporate limits of both cities.

10. Describe the arrangements which exist or will be made to insure satisfactory continuing public control over the operation or use of the facilities or equipment, whether publicly or privately operated.

The facilities and equipment obtained with capital grant funds from U.M.T.A. will be owned by, and for the use of, and will be under the continuing operational control of the Greater Lafayette Public Transportation Corporation, a public organization created by the cities of Lafayette and West Lafayette, Indiana under the laws of the State of Indiana.

11. Indicate whether or not the project will (a) adversely affect employees of the transportation system to be assisted, or of other transportation systems in the urban area, and identifies the systems and labor unions involved; (b) result in the relocation of families, individuals, business concerns, or non-profit organizations.

(a) The project will not adversely affect employees of the mass transportation systems in the Greater Lafayette Area but will, in fact, improve the working conditions for the employees of the Greater Lafayette Public Transportation Corporation. The new buses will be used to replace old equipment and to augment service so as to provide a higher level of public transportation in the Greater Lafayette Area. Six of the new 20 passenger buses will replace old buses presently being used on the fixed route bus, fixed schedule operations. An additional 8 new 20 to 35 passenger buses will be used on the fixed route bus, fixed schedule operations to provide a higher level of service through reduced headways and increased area of coverage. One new 20 passenger bus will be used as a spare for the operations described above. The new 12 passenger buses will be used for the demand responsive operation during off peak periods. The new terminal facility will replace the old rented bus garage.

The systems involved are the Greater Lafayette Public Transportation Corporation and the union involved is Division No. 1244 of the Amalgamated Transit Union (Appendix G contains the agreement between the Greater Lafayette Bus Company, Inc. predecessor of the Greater Lafayette Public Transportation Corporation and the Union).

(b) The proposed bus terminal will be located on a 5-1/4 acre tract of presently vacant land on Canal Road in Lafayette, Indiana which is zoned for industrial use. The development of this land into a bus terminal facility will not result in the relocation of any families, individuals, business concerns, or non-profit organizations. The property will be acquired through negotiations with the present owner without the use of the right of eminent domain by the Greater Lafayette Public Transportation Corporation.

12. Draft Environmental Statement.

1. The proposed project consists of the purchase of 15 twenty to thirty-three passenger air-conditioned buses with either gasoline, propane or diesel engines, 10 twelve passenger air-conditioned buses with gasoline engines, two way radios for each bus and a base station, and a bus terminal located on a 5-1/4 acre industrially zoned tract of land on Canal Road in Lafayette, Indiana. The bus terminal will include office and bus maintenance and storage facilities. The maintenance facilities include automatic bus vacuuming and washing equipment. No adverse impact on the environment is foreseen. In fact, an improvement in the local environment is foreseen as the new buses will replace buses presently being used on the streets of the Greater Lafayette Area that have an average age of 21 years and are presently polluting the environment with black smoke, loud noises and fuel smells. The buses in their turn-around condition also present an adverse effect to the visual environment of the area. The proposed terminal facility will replace a building built in 1895 which is too small for the present bus operation and requires the buses to be stored on the local streets around the bus garage.

2. No unavoidable adverse environmental effects of the project as proposed are foreseen. The buses will be equipped with anti-pollution devices that meet or exceed Federal anti-pollution requirements. The proposed terminal facility will be located on vacant land zoned for industrial use. Figure 3 shows the proposed terminal site. To the south of the site is the City of Lafayette Water Works. To the north is the Quality Beer Warehouse and various other commercial and industrial buildings housing Overhead Door Sales and Service. To the east is the vacant right-of-way adjacent to the tracks which is zoned for industrial use. To the west of the proposed bus terminal is land owned by the City of Lafayette which is zoned industrial, but is being acquired by the City of Lafayette Park Board for development as part of a regional park extending along the Wabash River.

3. No reasonable alternatives to the project are proposed as no adverse environmental impacts are foreseen.

4. See Section 1. for a discussion of short-term and local impact on the environment. No long-term adverse environmental impacts are foreseen.

5. No environmental impacts which will result in an irreversible commitment of resources will be made other than the building of a bus terminal on 5-1/4 acres of presently vacant land. A future development generated by this proposed project may be the increase in the size of the bus fleet operating from the bus terminal. No additional land will be needed in the future to accommodate possible increases in the number of buses to be serviced and stored.

12. Draft Environmental Statement.

6. No problems and objections have been raised to date by Federal agencies, State and local agencies, and citizens. However, public hearings have not been held as yet, nor have the state or local clearing house agencies been notified to date.

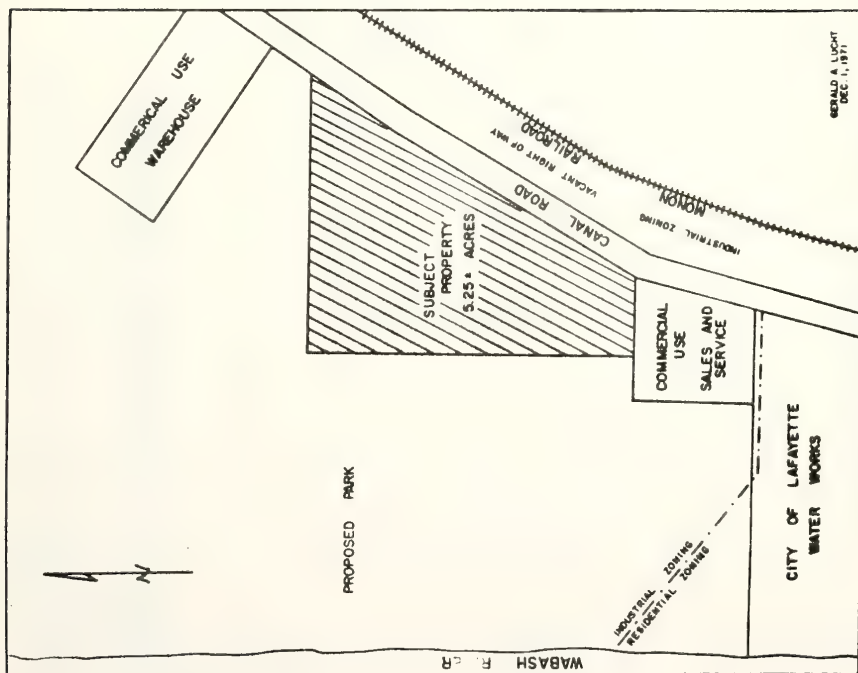


FIGURE 3 TYPICAL CITY LOCATION

GEORGE A. LIGHT
DEC. 1, 1971

The opinion of counsel showing that the Greater Lafayette Public Transportation Corporation is a public body authorized by law to carry out the above described project in the manner contemplated is included in Appendix H.

All of the funds requested from the Urban Mass Transportation Administration for this project/ would be disbursed within one year to complete the project. Depending upon the date of project approved, the funds may be disbursed over two Federal fiscal years.

Appendix J

Provided in this appendix is the 13(c) agreement signed by the Union and the Greater Lafayette Public Transportation Corporation.¹⁷ This example is provided to show the type of information that might be contained in a 13(c) agreement. This agreement must be signed if federal money is to be obtained.

ADDENDUM PURSUANT TO SECTION 13(c) OF THE URBAN
MASS TRANSPORTATION ACT OF 1964, AS AMENDED.

WHEREAS, the Greater Lafayette Public Transportation Corporation of Lafayette, Indiana ("Corporation") has filed an application with the Department of Transportation under the Urban Mass Transportation Act of 1964, as amended ("Act"), for a capital grant to finance the purchase of 15 new medium-size buses, 10 new mini buses, land for and construction of offices, maintenance and bus storage facilities, as more fully described in the project application ("Project"); and

WHEREAS, certain employees of the Corporation are represented by Local Union 1244, Amalgamated Transit Union, AFL-CIO ("Union"); and

WHEREAS, Sections 3(e)(1) and 13(c) of the Act require, as a condition of assistance thereunder, that fair and equitable arrangements be made as determined by the Secretary of Labor "to protect the interests of employees affected by such assistance"; and

WHEREAS, the parties have agreed upon the following arrangements as fair and equitable:

NOW, WHEREFORE, it is agreed that in the event the Project is approved for assistance under the Act the following terms and conditions shall apply:

- (1) The Project shall be carried out in such a manner and upon such terms and conditions as will not in any way adversely affect employees represented by the Union.
- (2) All rights, privileges and benefits (including pension, rights and benefits) of employees covered by this agreement (including employees having already retired) under existing collective bargaining agreements or charters, shall be preserved and continued; provided, however, that such rights, privileges, and benefits not previously vested

may be modified by collective bargaining and agreement of the parties hereto to substitute rights, privileges and benefits of equal or greater economic value.

- (3) The collective bargaining rights of employees represented by the Union, including the right to arbitrate labor disputes and to maintain union security and checkoff arrangements, as provided by applicable laws, policies and/or existing collective bargaining agreements shall be preserved and continued.

- (4) No employee represented by the Union shall be laid off or otherwise deprived of employment, or placed in a worse position with respect to compensation, hours, working conditions, fringe benefits, or rights and privileges pertaining thereto, as a result of the Project, including any program of efficiencies or economies directly or indirectly related thereto. An employee shall be retained in service by the Corporation unless or until laid off for reasons unrelated to the Project or until his employment terminates on account of his resignation, death, retirement, or dismissal for cause in accordance with agreements then in effect. An employee retained in service shall not be regarded as placed in a worse position, as above provided, in case of his failure to work due to disability or discipline or failure to obtain a reasonably comparable position producing compensation equal to or exceeding the compensation of his former position which is available to him in the exercise of his seniority rights, in accordance with agreements then in effect. The Corporation shall have the burden of affirmatively establishing that any deprivation of employment or other worsening of employment position has not been a result of the Project.

- (5) Any employee covered by the agreement who has been laid off or otherwise deprived of employment for lack of work, and any non-employee required to be retained in service by the Corporation under the provisions of this agreement who would otherwise be laid off for lack of work, shall be granted priority of employment or reemployment to fill any vacant position in the transit system for which he is, or by training can become, qualified. In the event training or retraining is required by such employment or reemployment, the Corporation shall provide or provide for such

training or re-training at no cost to the employee, and such employee shall be paid, while training or re-training, the salary or hourly rate of his former job classification. Such employment or reemployment shall not result in any worsening of the employee's position in his former employment nor any loss of wages, working conditions, hours, seniority, fringe benefits and rights and privileges pertaining thereto.

(6) In case of any labor dispute or controversy regarding the application, interpretation, or enforcement of any of the provisions of this agreement which cannot be settled by collective bargaining within sixty (60) days after the dispute or controversy first arises hereto, such dispute or controversy may be submitted at the written request of either party hereto to a board of arbitration as hereinafter provided.

Such party shall, within ten (10) days after such request, select one member of the arbitration board, and the members thus chosen shall select a neutral member who shall serve as chairman. Should the members selected by the parties be unable to agree upon the appointment of the neutral member within ten (10) days, any party may request the American Arbitration Association to furnish a list of five (5) persons from which the neutral member shall be selected. The parties shall, within five (5) days after receipt of such list, determine by lot the order of elimination, and thereafter the Union and the other interested party or parties shall, in that order, alternately eliminate one name until only one name remains. The decision by majority vote of the arbitration board shall be final, binding and conclusive. Such party shall pay the fees and expenses of the arbitrator if selected. The fees and expenses of the third or impartial arbitrator, as well as any other joint expenses incidental to the arbitration, shall be borne equally by the parties. The term "labor dispute", as herein used, shall be broadly construed and shall include, but not be limited to, any controversy arising concerning wages, salaries, hours, working conditions, or benefits, including health and welfare, sick leave, insurance, or pension or retirement provisions, any differences or questions that may arise between the parties, including

the making or maintaining of collective bargaining agreements, the terms to be included in such agreements, any grievances that may arise, and any controversy arising out of or by virtue of any of the provisions of this agreement for the protection of employees affected by the Project.

(7) Nothing in this agreement shall be construed as an undertaking by the Corporation, the Union, or the employees to forego any rights or benefits under any other agreement or under any provision of law.

(8) The term "Project", as used in this agreement, shall not be limited to the transit system or facility thereof which is affected by such assistance. The phrase "as a result of the Project" shall, when used in this agreement, include events occurring in anticipation of, during and subsequent to the Project.

(9) In the event any provision of this agreement is held to be invalid or otherwise unenforceable under federal, State or local law, such provision shall be re-drafted for purpose of adequate replacement under Section 13(e) of the Act. If such negotiation shall not result in mutually satisfactory agreement, any party may invoke arbitration under paragraph (6) hereof, or the jurisdiction of the Secretary of Labor, to determine substitute fair and equitable employee protective arrangements which shall be incorporated in this agreement, and/or any other appropriate action, remedy, or relief.

(10) The employees covered by this agreement shall continue to receive coverage under Social Security, Workmen's Compensation, unemployment compensation, and the like. In no event shall these benefits be worsened as a result of the Project.

(11) This agreement shall be binding upon the successors and assigns of the parties hereto, and no provisions, terms or obligations herein contained shall be affected, modified, altered, or changed in any respect whatsoever by reason of the arrangements made by the Corporation to manage and operate the system. Any

person, enterprise, body or agency, whether publicly or privately owned, which shall undertake the management or operation of the transit system, shall agree to be bound by the terms of this agreement and accept the responsibility for full performance of these conditions.

(12) In the event this Project is approved for assistance under the Act, the foregoing terms and conditions shall be made a part of the contract of assistance between the federal government and the applicant for federal funds, provided, however, that this agreement shall not merge into the contract of assistance, but shall be independently binding and enforceable by and upon the parties hereto, in accordance with its terms; nor shall the collective bargaining agreement between the Union and the operator of the transit system merge into this agreement but each shall be independently binding and enforceable by and upon the parties thereto, in accordance with its terms.

IN WITNESS WHEREOF, the parties hereto have executed this agreement by their respective duly authorized representatives this ____ day of _____, 1972.

LOCAL DIVISION 1234
ALABAMA TRANSIT UNION
GREATER LAFAYETTE PUBLIC
TRANSPORTATION CORPORATION

By _____ By _____

Appendix K

Provided in this appendix is a sample contract for the purchase of transit operations from a private operator by a transit authority.¹⁸ The important thing to note here is the number of items that must be specified and the detail.

RHODE ISLAND PUBLIC TRANSIT AUTHORITY

1188 Hospital Trust Building

Providence, R. I. 02903

HERBERT C. WELLS, JR., Chairman

SAMUEL C. KAGAN, Vice Chairman

ARTHUR J. DENLON, JR.

FRANK SCAMMATO

ROMEO S. MCERNE, SR.

JAMES E. EDWARDS, Secretary

May 26, 1965

United Transit Company
265 Melrose Street
Providence, Rhode Island

Gentlemen:

This letter of intent will confirm the oral understanding which we reached with you on April 30, 1965, as follows:

1. On or before November 1, 1965 (hereinafter referred to as the "Acquisition Date"), we shall purchase for \$2,700,000 (subject to the adjustments provided for in paragraph 7 hereof) all of your good will as the operator of the public bus transportation system now operated by you in the Greater Providence Metropolitan area, including all operational records as contrasted with strictly corporate records, and also all of your tangible property, both real and personal, whether or not referred to in your records, free and clear of liens, charges, and encumbrances (other than any leases of your property heretofore made by you in the ordinary course of your operations and other than as provided in paragraph 2 hereof), excepting only

(a) the following 112 buses (less fare boxes and radio equipment therein, which are not to be excepted):

28 Twin Coach Model 44-D, 44-passenger gas buses, acquired new in 1947;

23 Originally Pullman Standard trolley coaches, 44-passenger, acquired new in 1943-1946 and subsequently converted in 1953-1957 to diesel buses by the installation of Leyland diesel engines; and

63 Used GMC diesel buses purchased from Public Service Coordinated Transport (which 112 buses are hereinafter referred to as the "Excluded Buses"); and

(b) that portion (not to exceed 51%) of the nearly rectangular tract of land, having an area of about 171,160 square feet (which tract is hereinafter referred to as "Lot 12"), in Providence located on Melrose Street between Longfellow Street and Roger Williams Avenue and presently used for employee parking and for the operations of United Truck and Bus Service Co. (hereinafter referred to as "United") which is indicated on Exhibit A hereto

United Transit Company
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May 26, 1985

by the words "To be Retained by the UTC" (which portion of Lot 12, together with the buildings and improvements thereon, is hereinafter referred to as the "Excluded Realty").

2. With respect to the portion of Lot 12 which is to be conveyed to us, except only in the case of the transfer thereof by us to someone to whom we shall, as part of the same transaction, transfer the major portion in value of the assets to be acquired by us from you on the Acquisition Date, you shall have a right of first refusal, which shall be assignable by you only to United and which shall terminate upon (a) the transfer of the Excluded Realty by you to anyone other than United or (b) the transfer of the Excluded Realty by United to anyone. So long as said right of first refusal remains in effect and so long as Melrose Street abutting the Excluded Realty remains unimproved, the portion of Lot 12 which is to be conveyed to us on the Acquisition Date shall be subject to an easement of access to the Excluded Realty in favor of the Excluded Realty.

3. With respect to the Excluded Realty, except with respect to a transfer to United as permitted in paragraph 2 above, we shall have a right of first refusal, assignable to any person who shall acquire the major portion in value of the assets to be acquired by us from you on the Acquisition Date.

4. Commencing on the Acquisition Date you shall lease to us the Excluded Buses at a rental of \$55 per month per bus. During the term of such lease we shall maintain the buses (including tire rental) at our expense. Whether a minimum rental term is to be guaranteed by us, and, if so, the length of such minimum rental term, will be the subject of further negotiations between us after we have received a delivery schedule for the 107 new buses with which we intend to replace the Excluded Buses.

5. We shall lease to you office space in the Body Shop and Office Building on such terms and conditions as may be agreed upon.

6. We shall furnish to United substantially the same repair services which are now furnished by you to United, in consideration of United's payment to us of our costs plus one half of the difference between our costs and United's charges to its customers.

7. You represent to us, and we understand, that you will own on the Acquisition Date all of the real property and all of the buses which you owned on September 30, 1964, and that the only differences between the tangible personal property owned by you on September 30, 1964, and such property to be owned by you on the Acquisition Date will result from wear and tear and dispositions and substitutions made in the ordinary course of your operations. An inventory of tangible personal property other than buses shall be taken jointly by representatives of you and us as of the Acquisition Date; and to the extent that the tangible personal property, other than buses, to be acquired is found to be greater or less than such property owned by you on September 30, 1964, said purchase price of \$2,700,000 shall be adjusted as follows: Property acquired since September 30, 1964, shall be valued at the actual cost thereof to you or the replacement cost as of the Acquisition Date,

United Transit Company
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whichever is lower; and property disposed of since September 30, 1964, shall be valued at the actual proceeds therefrom received by you.

8. We shall not assume any of your liabilities except as we may be required to do so by the provisions of section 39-18-17 of the General Laws and except as to supply contracts, leases of real property in which you are the lessee, and other liabilities to which you have subjected yourself in the ordinary course of your operations as operator of a public bus transportation system under agreements to the benefits of which we shall become entitled on the Acquisition Date.

9. The obligations of both of us hereunder and under the formal agreement which, it is contemplated, will supersede this letter of intent, are subject entirely to the condition that we be successful in our efforts to raise the money necessary to consummate the acquisition of the UTC's property as herein provided. (It is recognized that the success of such efforts will depend upon the successful marketing of our revenue bonds, which in turn will depend upon the approval of our application of an HHFA grant in twice the amount of the \$819,000 appropriation recently made by the Rhode Island General Assembly.)

10. You shall not, without our consent, except as may be required by law, prior to the Acquisition Date make (a) any further changes in your supervisory personnel or (b) any substantial changes in your transportation operations (other than such changes as you have customarily made in the past to meet changing seasonal conditions).

If you agree that the foregoing correctly states the understanding between us, please sign and return the enclosed carbon copy hereof.

RHODE ISLAND PUBLIC TRANSIT AUTHORITY

By Herbert C. Wells, Jr.
(Chairman)

The foregoing correctly
states the understanding
between us.

UNITED TRANSIT COMPANY

By C. Arthur E. Lewis
(President)

Appendix L

Contained in this appendix are the authors' suggestions for future research in the area of bus transit planning and operation. These suggestions are aimed at providing information to the small transit firms that usually have little money and/or personnel for doing original research.

Recommendations for Research

In gathering information for the development of this report a number of areas were found to be lacking adequate information. These areas should provide excellent topics for future research.

1. There is a definite need for information on the design of fixed route, fixed schedule bus systems for small urban areas. In particular, information is needed on ways to approach routing and scheduling and the type and sources of data on which to base this routing and scheduling.

2. Another area of need is for verification of methods to be used in marketing bus transit in small urban areas. Information is needed on techniques which might be used to promote major system changes once transit planning is complete. Also, needed is information on techniques to be used in an on going promotional program.

3. Information is needed concerning the use of special services by publicly owned bus systems in small urban areas. Included here would be the legal restrictions on publicly owned systems governing the use of such services

as charter service, special school routes, etc. Information on setting up and promoting these special services is lacking.

4. Research should be done to develop a planning program that can be used by bus systems in small urban areas. The program should cover such things as organizational needs, staff and space; when and how to collect data as well as what type of data to collect; and how to analyze the data. The program must be aimed at the small firm that has limited personnel to work on the planning program.

Appendix M

Notes for Appendices

¹Comprehensive Planning Organization, Job Number 6103, Transit Survey (801 Co Administration Center, San Diego, California 92101, March, 1970), p. 52.

²Institute for Urban Transportation, Graduate School of Business, Indiana University, Mass Transit Management: A Handbook for Small Cities, Director George M. Smerk (Bloomington, Indiana, February, 1971), p. 273.

³Kenneth J. Dueker and James Stoner, Mass Transit Technical Study: Iowa City (Institute of Urban and Regional Research, The University of Iowa, Iowa City, Iowa, September, 1971), pp. 26-27.

⁴Joint Highway Research Project, Purdue University, The Greater Lafayette Area Bus Transit Study, Project director Kenneth W. Heathington (Civil Engrg. Bldg., Lafayette, Indiana 47907, April, 1971), pp. 173.

⁵Ibid., p. 175.

⁶CE 664, Urban Transportation Planning, Term Project, Purdue University, Greater Lafayette Area Bus Study, Professor Kenneth W. Heathington (Civil Engrg. Bldg., Lafayette, Indiana 47907, January, 1971), p. 76.

⁷Ibid., p. 15.

⁸Joint Highway Research Project, pp. 209-213.

⁹U.S. Department of Commerce, Bureau of the Census, 1970 Census Summary Tape User Memorandum No. 30 (Revised) (Washington, D.C. 20233, February 28, 1972), pp. 1-5.

¹⁰U.S. Department of Commerce, Bureau of the Census, First Count Summary Tapes from the 1970 Census of Population and Housing (Washington, D.C. 20233, March, 1970), pp. 1-8.

¹¹U.S. Department of Commerce, Bureau of the Census, Summary Tape Processing Centers (Washington, D.C. 20233, September, 1971), pp. 1-12.

¹²Tippecanoe County Area Plan Commission, Greater Lafayette Area Transportation and Development Study, Bus Study Questionnaire (Courthouse, Lafayette, Indiana 47907, 1971).

¹³Institute for Urban Transportation, pp. 202-203.

¹⁴Greater Lafayette Public Transportation Corporation, Advertisement, Form of Proposal, Specifications, Bidders Bond, Form of Agreement, Performance Bond, Conditions and Instructions to Bidders and General Instructions for Sixteen (16) Medium Sized Transit Type Motor Coaches (324 Ferry Street, Lafayette, Indiana 47907, 1972), pp. 1-33.

¹⁵Joint Highway Research Project, pp. 114, 123-125, and 146-149.

¹⁶Greater Lafayette Public Transportation Corporation, Preliminary Application for a Capital Grant from the Urban Mass Transportation Administration (324 Ferry Street, Lafayette, Indiana 47907, December 14, 1971), pp. 1-23.

¹⁷Greater Lafayette Public Transportation Corporation, Agreement Pursuant to Section 13(c) of the Urban Mass Transportation Act of 1964, as Amended (324 Ferry Street, Lafayette, Indiana 47907, 1971), pp. 1-3.

¹⁸Simpson and Curtin, Transportation Engineers, 1405 Locust Street, Philadelphia, Pennsylvania 19102, Acquisition and Public Operation of Transit Services in Providence-Pawtucket Metropolitan Area (Prepared for the Rhode Island Public Transit Authority, Providence, Rhode Island, June, 1965), pp. 58-60.

